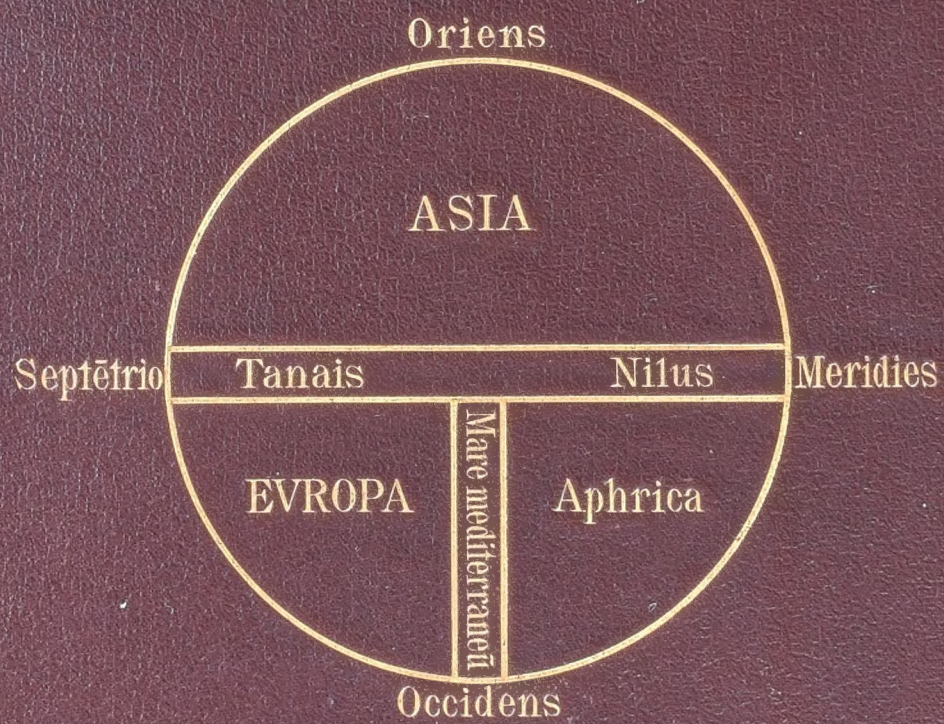


A. E. NORDENSKIÖLD

PERIPLUS



1897

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PREFACE.

When the author, eight years ago, published his **Facsimile-atlas to the early history of Cartography**, there did not exist in the libraries of Sweden the material necessary for the extension of his researches to manuscript maps or charts. It was therefore necessary to limit the work in the main to an examination of early printed maps. Since then this deficiency has been supplied by studies in foreign libraries, by procuring photographic reproductions of the most important manuscript maps and charts, not accessible in the original, and by the purchase, when possible, of many such documents of importance for the history of cartography.

This **Periplus** is the result of a careful examination of the material thus collected. In publishing it the author has to ask forbearance for the many defects, unavoidable in an essay based on such wide-spread material as this, and for a kindly criticism of the new opinions here often advanced.

In preparing the work for the press the author has had valuable assistance from Dr. Severin Bergh, of the Swedish State Archives, who has not only supervised the proof sheets and the reproduction of maps, but also verified the numerous references. Valuable hints and information have also been obtained from the Librarian at the Royal Academy of Science, Dr. E. W. Dahlgren, who moreover directly contributed to the Periplus the important chapter XI (*Sailing-directions for the Northern Seas*).

The requests for permission to reproduce for this work old manuscript or printed maps everywhere met with consent. For this it is the author's agreeable duty here to express his thanks to the Directors of the Royal Library and State Archives at Stockholm, to the Librarians at the Universities of Upsala and Lund, the Keeper of Maps in the British Museum, the Librarians of the Royal Libraries at Berlin and Copenhagen, of the Library of Rostock University, of the Archivio di Stato, Biblioteca Nazionale, Laurenziana and Riccardiana at Florence, to Count Brahe at Skokloster, and to Messrs. E. T. Hamy, G. Marcel, and A. Lesouëf in Paris.

The translation of the Swedish original into English has been executed by Mr. Francis A. Bather, of the British Museum (Natural History), who has also translated the numerous quotations from Greek writers directly from the originals. It is a pleasant duty for the author here to express his best thanks for the assistance this gentleman has thus afforded him. In the translation of the last thirteen sheets, valuable help was rendered by the Rev. E. Shepherd of Stockholm.

The Periplus may be regarded as a second volume to the Facsimile-atlas. The author hopes that the student of the history of Geography and of the spreading, since the time of Henry the Navigator, of the white race over the surface of the earth, will find in these two works a collection of original documents, richer in its kind than even large libraries can afford, and more readily accessible.

Stockholm, August, 1897.

A. E. NORDENSKIÖLD.

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1. The first part of the book is devoted to a general survey of the history of the English language from its origin to the present time. It is divided into three main periods: the Old English period, the Middle English period, and the Modern English period. The Old English period is characterized by the use of Old English, which was the language of the Anglo-Saxons. The Middle English period is characterized by the use of Middle English, which was the language of the Middle Ages. The Modern English period is characterized by the use of Modern English, which is the language of the present time.

2. The second part of the book is devoted to a detailed study of the grammar of the English language. It covers the various parts of speech, the various tenses, and the various moods. It also covers the various figures of speech and the various rhetorical devices.

3. The third part of the book is devoted to a study of the literature of the English language. It covers the various periods of English literature, from the Middle Ages to the present time. It also covers the various genres of English literature, such as the novel, the drama, and the poetry.

4. The fourth part of the book is devoted to a study of the history of the English language. It covers the various changes in the English language over time, and the various factors that have influenced these changes.

5. The fifth part of the book is devoted to a study of the English language in different parts of the world. It covers the various dialects of the English language, and the various influences that have shaped these dialects.

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¹ N = original in author's collection.

² KB = original in the Royal Library at Stockholm.

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P. 25, note 3. The legends on Giroladis' portolano of 1426 have been collated by Mr. Fr. Milcke with the original in the Biblioteca Marciana at Venice.

P. 46. The maps on plate II are reproduced, not from Santarem, but from a copy of Dati's "La sfera" in the author's collection. This copy was acquired after the printing of chapter VI.

P. 57. A portolan-atlas by PETRUS VESCONTE, 1313. This consists of six parchment leaves fastened on wooden boards (0.500 X 0.315 m.). The leaves comprise: I. Calendar-diagrams. II. The Black Sea. III. The Archipelago. IV. The Eastern Mediterranean. V. The Central Mediterranean. VI. a. The Adriatic Sea. b. The Western Mediterranean and the west coast of Europe as far as England and the Netherlands. The first leaf is signed "Petrus Vesconte de Janua fecit istas tabulas anno Domini MCCCXIII". For a detailed description I must refer to the sale catalogue (*Galleria G. Sangiorgi. Anno VI. Catalogo 69*, Roma 1896), in which this interesting map is offered for sale.

P. 58. A portolano by DULCERT of 1330, in the possession of Senator Prince Thomas Corsini, is mentioned in the preface to *Choix de cartes et de mappemondes des XIV^e et XV^e siècles*, publié par GABRIEL MARCEL, Paris, Ernest Leroux, 1896. Dulcert's map of 1339 is reproduced in the *Choix* etc., together with "Carte Pisane", the portolano by Mecia de Viladestes bought in 1857 for the Bibliothèque nationale at Paris, and an undated portolano by Soleri (circa 1380).

Pp. 58 and 59. According to CESAREO FERNANDEZ DURO (*Los cartógrafos Malorquines Angelino Dulceti, Jafudá Cresques; Bol. Soc. geogr. Madrid*, XXXI, 1891, p. 293) D. Gabriel Llabrés "catedrático y archeólogo de Palma" has been able to ascertain that the "Atlas Catalan" of 1375 was compiled by a Jew, Jafudá Cresques, for King John I of Aragon, who afterwards presented it to the King of France.

P. 59. Pinelli-Walckenaer's portolan-atlas is now preserved in the British Museum.

P. 60. A portolan-atlas by GRATIOSUS BENINCASA, 1467, in the possession of Mr. Lesouëf in Paris, is here reproduced on plates XXXIII and XL from excellent photographs which I received from Mdle. Jeanne Smith. See p. 126.

P. 62. A map by GABRIEL DE VALSEQUA of 1439. Mentioned by SANTAREM and said to be the first map in which regard is paid to Portuguese voyages of discovery. See p. 126, footnote. May it not be the same map as is cited here on p. 62?

P. 64. An anonymous undated Portuguese map of the world (about 1502), in the possession of Dr. E. T. Hamy of Paris, is here reproduced on plate XLV. See p. 128.

P. 64. On the portolan-atlas by ANGELUS EUFREDUTIUS of 1556, which is preserved at Mantua, see p. 160 (Cartography of Asia no. 110).

P. 65. Among maps, which were probably issued from BATTISTA AGNESE's map manufactory, may also be mentioned Philip II's and Queen Christina's portolanos. See pp. 181 and 182 (Cartography of America nos. 115 and 147).

P. 68. A portolano by MATHEUS PRUNES, 1553, is partly reproduced in KRETSCHMER's Atlas, plate IV.

P. 150. To the Cartography of Asia should be added: (1503). Sketch map by BARTHOLOMEW COLUMBUS. Cf. p. 178.

P. 153. The work of Trutvetter was published in 1514 (not 1524). Cf. p. 179.

P. 167. In the "Legends on maps of America 1527-1546" the names inserted on the same line do not always correspond, but are always from about the same part of the coast. Want of space has necessitated this arrangement.

In the List of portolanos (chapter VIII) hand-drawn maps of the New World as well as maps of the world, on which the New World occupies the greatest portion of the map, are not mentioned. For these I must refer to the three last chapters of this work, where most of these maps are enumerated and many of them reproduced.

With regard to chapters IV to IX, in which I pronounce opinions regarding the portolanos in many respects deviating from the ideas generally adopted, I should remind the reader that these chapters were in type before I received: ERNST STEGER, *Untersuchung über italienische Seekarten des Mittelalters auf Grund der Kartometrischen Methode*, Göttingen 1896. A preliminary notice of the results of my researches is printed in: *Report of the sixth international geographical congress in London 1895*, London 1896.

Dr. GEORGE H. F. NUTTALL has, in a letter to me, given a translation, deviating from Harris's and several other interpretations, of the inscription under the picture of the Christ-child on Juan de la Cosa's map: "Juan de la Cosa hung this (picture of St. Christopher) in the entrance of (the church of) Santa Maria in the year 1500." He adds: "From what I have seen in Spain and Mexico, it seems to me quite clear that we have to deal here with a votive picture. These are frequently seen in Spanish churches and are called 'milagros'. St. Christopher is a patron saint of mariners, and it seems quite natural that the votive picture should be repeated in the map." How far this interpretation is to be preferred to the ordinary explanation according to which Cosa "made it at the port of Santa Maria in the year 1500", I dare not decide.

Errata.

(a indicates the first column, b the second.)

Page	to	b,	line	16	instead of	Edrisi	read:	Edrisi
15	a	»	5	»	named	Guzarate	»	from Guzarate
16	a	»	17	»	Barent	»	»	Barents.
24	a	»	4	»	navigare	»	»	navigare
55	a	»	10	»	Jaume Olives	»	»	Domingo Olives
72	b	»	12	»	Camosio	»	»	Camocio
73	a	»	20	»	Thiele	»	»	Tiele
95	legend	to	figure	»	36.	»	»	39.
96	note	1	»	»	p. 44	»	»	p. 46
»	note	3	»	»	pp. 55	»	»	pp. 57



I. PTOLEMY: The Mediterranean and the Black Sea.

I.

Greek and Roman Cartography before Ptolemy.

There is not extant any Greek or Roman map from the time before Claudius Ptolemaeus, that is, before the 2nd Century A. D., and in the writings of old time that have come to our hands the mention of such works is only exceptional and incidental. The cartography that preceded Ptolemy formed, however, the base on which he erected his great geographical work, the maps of which form the prototype of modern maps and charts. It has therefore repeatedly been subjected to researches and commentaries, very learned and exhaustive, but too often bearing witness to an imperfect appreciation of the scantiness of the material under discussion. I think, therefore, it will be convenient to begin this essay with a short review of those passages in classical authors where maps are mentioned.

HERODOTUS tells us (V: 49), that Aristagoras, the tyrant of Miletus, when trying (about the year 500 B. C.) to induce the Spartans to go to the aid of the Ionians in their war with the Persians, showed to Cleomenes, the king of Sparta, "a copper plate, on which the whole circuit of the earth was engraved, and all the sea, and all rivers." And, in chapters 135 and 136 of Book III, he narrates that Darius sent out from Phoenicia two triremes and a cargo-boat, in order to examine and delineate the coasts of Hellas.

In another place (IV: 36) Herodotus, with obvious reference to a map of the world, says: "But I laugh when I see many who already have drawn the circuits of the earth, without any right understanding thereof. Thus they draw Oceanus flowing round the earth, which is circular, as though turned by a lathe, and they make Asia equal to Europe. In a few words therefore I will make clear the size of each of those quarters, and the way in which each should be drawn." Oddly enough, this way of drawing a map of the world,

A. E. N. II.

though blamed by Herodotus, was almost the only one used during the whole of the Middle Ages, not only for maps like that of Macrobius, probably based on ancient Greek models, but also for the planispheres of Marino Sanudo and Fra Mauro. It was these "wheel-maps" that subsequently originated that division of the surface of the globe into two hemispheres which is now common in drawing maps of the world.

A century before Anaxagoras—as a quotation by Strabo from Eratosthenes informs us—a map of the world had been made by Anaximander of Miletus; but the passages from Herodotus quoted above are the first in extant Greek literature where a map is spoken of.

In ARISTOPHANES' comedy "The Clouds," produced at Athens in the first year of the 89th olympiad, that is, in the year 423 B. C., there occurs the following dialogue between the countryman Strepsiades and one of the disciples of Socrates (lines 202—217):

Strepsiades: This then [pointing to a geometrical instrument]; how is it useful?

Disciple: To measure up land.

Strepsiades: Do you mean the allotment-land?

Disciple: No! the whole world.... Here you have the circuit of all the earth. D'ye see? here is Athens.

Strepsiades: What d'ye say? I can't believe that, when I don't see the judges sitting.

Disciple: Yes, really; this is the district of Attica.

Strepsiades: And where are my countrymen, the Cicynni?

Disciple: There they are put. But look! at any rate you see Euboea stretched out in all its length.

Strepsiades: I see; that's because it was stretched by us and Pericles. But Lacedaemon—where's that?

Disciple: Where is it? Why, here!

Strepsiades: So close to us! Look to this well; you must move it off, right away from us.

Disciple: That's impossible."

Even if the passage quoted tells us nothing about the maps in the time of Aristophanes, it shows us that real maps did exist and that they were well known to the public.

In the collection of tales, "Variae Historiae," which was compiled by AELIAN during the third century A. D., it is written in book III, chapter 28: "When Socrates saw Alcibiades puffed up by his wealth, boasting of its abundance and still more about his lands, he led him to a certain place in the city where there was deposited a plate having on it the circuit of the earth, and bade him look for Attica thereon. When Alcibiades had found it, Socrates bade him point out his own lands. And on his replying, 'But they are nowhere drawn,' 'These then,' said he, 'make you boast, though they are not even a part of the earth.'"

DIOGENES LAËRTIUS tells us (V: 2) that Theophrastus (who died about 287 B. C.) dictated in his will that a colonnade in the neighbourhood of the Museum of Athens should be restored, and that tablets on which a map of the world was drawn should be hung up there.

APOLLONIUS RHODIUS (died about 186 B. C.), who finally was librarian at the Museum of Alexandria, in lines 277—281 of the 4th canto of his "Argonautica," makes Jason say: "But of a surety Aea still stands firm.... They still maintain the graven columns of their fathers, on which all roads and the limits of moist and dry are, on all sides, for them that come there."

MARCUS TERENTIUS VARRO (about 116—27 B. C.) introduces the second chapter of the first book of his work "De re rustica" with the account how, at a sowing-festival, he met his father-in-law, a Roman knight, and a farmer, looking at a map of Italy painted on a wall (*spectantes in pariete pictam Italiam*).

PROPERTIUS, who lived at about the same time as Varro, in one of his elegies (IV: 3) makes a sweetheart write to her lover who is away in a far country:

"Et disco, qua parte fluat vincendus Araxes,
Quot sine aqua Parthus milia currat equus,
Conor et e tabula pictos ediscere mundos,
Qualis et haec docti sit positura dei,
Quae tellus sit lenta gelu, quae putris ab aestu,
Ventus in Italiam qui bene vela ferat."

VITRUVIUS (first century B. C.) in the 2nd chapter of his 8th book, "De aqua imbrum ejusque virtutibus," says: "...capita fluminum, quae orbe terrarum chorographiis picta, itemque scripta, plurima maximaque inveniuntur egressa ab Septentrione."

The most exhaustive account of pre-Ptolemaic maps is that left us by STRABO (about 63 B. C.—25 A. D.), especially in the second book of his great geographical work. He speaks here about the fresh information concerning distant countries before unknown, which he had acquired through his own and other people's travels, and describes, although in rather obscure language, the way to draw maps. Moreover he gives a detailed discussion of the changes made by Eratosthenes on older maps, where India was placed too far to the north, as well as the objections raised by Hipparchus to these changes. Eratosthenes depended chiefly on Patrocles, commander of the navy under the earliest rulers of the Syrian Empire, on reports to Alexander, put at the disposal of Patrocles by the treasurer Xenocles, and on manuscript accounts which were at the command of the keeper of the library at Alexandria.

Strabo's quotations, however, give us no idea of the construction of the maps in question. We merely see that among

the Greeks and Romans, even of Strabo's time, the knowledge of the countries beyond the immediate neighbourhood of the Mediterranean and the Black Sea, was exceedingly incomplete. Strabo, for instance, held that Ierne (Ireland) lay to the north of Britain, and that on account of the cold it could be inhabited only with difficulty, also that one could sail from the Indian Ocean into the Caspian Sea. He rejected Pytheas' accounts of Scandinavia as fairy-tales, and so on. Of the northern lands moreover, Britain included, he expressly says: "it is no use knowing them and their inhabitants, since they can do us neither good nor harm." A more striking proof of the uncertainty of political predictions and of the unfairness of setting up utility as the immediate goal of research, has seldom been afforded.

In book III, chapter 2, of his "Historia Mundi", PLINY (23—79 A. D.) says, with reference to the length and breadth ascribed to Hispania Baetica: "Agrippam quidem in tanta viri diligentia, praeterque in hoc opere cura, cum orbem terrarum urbi spectandum propositurus esset, errasse quis credat, et cum eo divum Augustum? Is namque complexam eam porticum ex destinatione et commentariis M. Agrippae a sorore ejus inchoatam peregit." This map of the world, which, according to this account, Caesar Augustus ordered to be constructed in Rome according to a plan drawn up by Agrippa, has been the subject of very extensive commentaries grounded on no real facts. If to the many ancient guesses, I add the one that the work consisted of a splendidly drawn map of the known world, *οἰκουμένη*, poor in names and of little geographical consequence, I shall not run very great risk of mistake. In the first place, the walls of a portico do not lend themselves to decoration by detailed maps, and, so far as I can find, the words of Pliny quoted above in no way imply that there was any question here of a map of the world executed in detail.

This work has, though without sufficient reason, been connected with the measuring of the Roman Empire, which was begun by Julius Caesar and completed under Augustus. In any case we know very little about this measuring, which possibly was of distances by road; and all that we do know of it consists of some distances given by Pliny, which were probably based on this measuring, and a mention in the "Cosmography" of AETHICUS, a geographical compilation of the fourth century(?), the origin and value of which are doubtful.¹

In his life of Domitian, Suetonius enumerates among the reasons why Domitian condemned the senator Metius Pomponianus to death, that the latter had brought with him a map of the world painted on skin. The same story is told by Dio Cassius (LXVII: 12) and Zonaras (XI: 19), except that, according to them, the map was painted on a wall of the senator's bed-room.

AGATHEMERUS, who lived towards the close of the second century A. D., begins his geographical work, *Γεωγραφίας ἐποτύπωσις*, with the following statements: Anaximander of Miletus, a disciple of Thales, was the first that ventured to draw the inhabited world on a plate; and after him a similar work was carried out in an admirable manner by the great traveller, Hecataeus of Miletus. Hellanicus of Lesbos, with his varied learning, had lectured on history without a map. The ancients drew the inhabited world round, with Greece in the middle, and in the centre thereof Delphi, which was thought to be the navel of the earth. Later on Democritus, out of his larger experience, drew the world as an oblong, half as long again as wide, a view shared by Dicaearchus the peripatetic. Eudoxus supposed its length to be double the width; Eratosthenes, more than double. Crates compared the shape of the inhabited world

¹ Compare VIVIEN DE SAINT-MARTIN: *Histoire de la géographie*, Paris, 1873, p. 157; and CARL MÜLLER under *Ethicus* in the *Nouvelle biographie générale* of Didot-Hoefer.

to a semicircle; Hipparchus, to a table. Others likened it to a fish-tail; the stoic Posidonius, to a sling; and so on.¹

The following mention of a map belongs, it is true, to a date after Ptolemy, but its connection with what has been quoted above allows it to find a place here. The Gallic rhetorician EUMENIUS says in his "Oratio pro restaurandis scholis," delivered in Augustodunum about 296 A. D.: "Omnium cum nominibus suis locorum situs spatia intervalla descripta sunt, quidquid ubique fluminum oritur vel conditur, quacunquē se litorum sinus flectunt, quo vel ambitu cingit orbem vel impetu irrumpit oceanus. Nunc demum iuvat orbem spectare depictum, cum in illo nihil videmus alienum." Augustodunum, the present Autun, was, at the time of the Romans, a rich and important city, "soror et aemula Romae," with a much-frequented college. The speech of Eumenius was delivered on the occasion of the re-opening of this college, after it had been destroyed by an invasion of the barbarians. This is the earliest mention of a map made in the countries north of the Alps.²

While we are discussing maps of olden times, it may also be mentioned that there has been found in Egypt a papyrus of the 13th century B. C., on which a plan of some Nubian gold mines had been drawn. This papyrus forms the oldest map we know.³ According to STRABO (Book XVII) the very art of land-surveying was probably first discovered in Egypt, because, as Strabo expressly states, it was necessary there to measure exactly the small allotments into which the fertile land was divided, in consequence of the ease with which the boundary-marks were defaced by the inundations of the Nile.

The passages quoted contain everything worthy of mention concerning geographical maps that has been met with in Greek and Roman authors before Ptolemy. It is not much, and would give us little help had we to reconstruct any of the maps spoken of. This gap in classical geographical literature depends, as I have already pointed out in a previous work, without doubt on this, that the learned of antiquity occupied themselves more with schematic or philosophical images of the world than with really practical detailed maps. Nor is it likely to have been customary at that time to illustrate scientific essays with drawings. It is none the less striking that among the thousands and thousands of household goods and works of art, that have been exhumed from the ruins, ash-beds, and debris of antiquity, there has never been found any map engraved on metal or on a globe,⁴ and that drawings of maps of the earth have never been found engraved on the monuments, coins, or medals of the ancients.

That apparently paradoxical doctrine of the spherical shape of the earth, the fundamental law of geography and cosmography, had nevertheless been generally accepted among the learned many centuries before our era. STRABO tells us (II: 4) that Crates⁵ had made a terrestrial globe; and he himself gives the advice, *to draw the map of the inhabited world if possible on a globe; but the globe ought to be at least 10 feet in diameter, since the geographical map must be inscribed in a quadrilateral figure, which only occupies a small part of the surface of the sphere.* Starting from the doctrine of the spherical shape of the earth, many successful attempts to measure the size of the globe had already been made. The area of the known inhabited

portion of the earth's surface had been compared with the surface of the earth in its totality, and had been found to occupy only a quarter of the surface of the celestial body on which we dwell. Hence men had been led to make ingenious speculations, not only as to the possibility of antipodeans and as to the natural conditions of the part of the globe that they inhabited, but also as to the possibility of inhabiting the *terra australis incognita*, that is to say, the southern part of the old hemisphere — which was supposed to be separated from the inhabited world by burning deserts and by a sea, impassable by reason of the heat and because of the mire and sea-weed with which it was filled — as well as the northern part of the opposite hemisphere, which was supposed to be constituted in the same way as the inhabited world, but separated therefrom by a sea too wide to be passed by vessels. Strabo (II: 4) expressly holds out the possibility that the opposite side of the northern hemisphere may be inhabited, "but in such case one must look on that part of the earth's surface as another quarter of the globe."

These theories and the controversies excited by them probably led men to draw different kinds of maps of the world. But such maps, if they ever existed, have all been lost. Yet it is probable that maps of the world of the kind that has been found in various mediaeval manuscripts of MACROBIUS, are more or less altered copies of diagrammatic maps of the world from the older days of classical antiquity. It is also possible, that FIORINI (op. cit. p. 872) is right in his supposition, confirmed as it is by the above-quoted passage from Strabo, that the lack of ancient terrestrial globes depends on the fact that the inhabited world was thought to occupy so small a part of the surface of the earth that geographical needs hardly required a whole globe to be made for the representation of this one part.

Charts, *i. e.* maps specially intended for sea-farers, are not even alluded to by the older Greek and Roman authors. But that such charts really existed during the period here in question, is shown by the account which PTOLEMY, in the introduction to his "Geography", gives of a chart (from Tyre or drawn by the Tyrian Marinus), of which several revisions were published, and which, to judge from Ptolemy's description, must have been of essentially the same stamp as those mediaeval charts known under the name of *portolanos*. The charts of Marinus are not spoken of by other Greek or Roman authors, any more than are the *portolanos*, with some few exceptions, ever mentioned in the writings of the schoolmen, although they were the most complete cartographical works of the Middle Ages. But if charts of the time here in question are absolutely wanting, nevertheless there are extant several so called *peripli* or descriptions of the coasts, dating from this period, of which some at least have served as guides for sea-farers; and which, as regards both contents and form, correspond to the written *portolanos* (*opera chiamata portolano*) of the Middle Ages, the "Laskartböcker" (explanations of maps) or sailing-directions of modern times. Like these, they were probably intended for explanations of coast-charts now lost. Indeed the charts of Marinus of Tyre were, according to Ptolemy, accompanied by such an explanatory text. I shall therefore give here a short account of these works. They form the first germ of the sailing-directions of the present time, so important from a practical point of view though entirely overlooked as literary productions. But as these writings give one a good idea of

¹ *Geographi graeci minores*, ed. CAROLUS MULLERUS, II, Parisiis 1861, p. 471.
² *Geographi latini minores*, ed. A. RIESE, Heilbronnæ 1878, p. IX.

³ A. ERMANN, *Aegypten*, Tübingen 1885, p. 619.

⁴ On the other hand, a statue of Atlas, supporting a celestial globe on his shoulders (the Farnesian Atlas), is extant from about 300 B. C. The work is executed in marble and has a height of 1.65 metres; the globe itself has a circumference of 2 metres. See M. FIORINI: *Le sfere cosmografiche e specialmente le sfere terrestri* (Boll. d. Soc. geogr. ital. 1893, p. 866). Celestial globes are often represented on coins and medals (comp. KONRAD MILLER: *Die ältesten Weltkarten*, III, Stuttgart 1895, p. 129).

⁵ Probably Crates of Mallos in Cilicia, who lived during the 2nd century B. C.

the manner in which men had to effect sea-connection between different places in ancient times, I shall introduce this account by a short retrospect of the courses then chosen by sea-farers for sailing from one place to another.

When criticizing the sea-voyages of olden times, we should remember that, before the invention of the compass, the navigator had at his disposal no means of determining the cardinal points when on the open sea in cloudy weather. The vessels of those days were moreover unfit both for cruising and for braving rough sea. Their want in the former respect was made up for by the vessels being supplied with a great number of oars managed by a numerous crew of rowers, often placed in several rows one above the other (biremes, triremes, quadriremes). This was especially the case with the men of war. Trading-vessels, which could seldom be manned with several hundred rowers, would have had then, as was still the case in the middle of the 19th century, no other motive force than that of the wind. The ancient biremes and triremes, on the contrary, were to a certain extent independent of wind and stream, as are the steamers of to-day. But their manual labour only made up for steam imperfectly, and was more difficult to maintain.¹ When weather and sea were calm this kind of ship was convenient enough, but had difficulty in withstanding contrary winds and heavy sea. To this was added the impossibility of finding its course when on the open sea. It was obliged, as far as possible, to sail along the coasts, to wait in harbour for favorable weather, and, while on a voyage, to get at short intervals to good anchorages, where it could take in provisions and water for its numerous crew. The pilot of the vessel was therefore bound to have a good knowledge of the ports, anchorages, shallows, currents, and prevailing winds, along the whole coast that he sailed. Navigation along unknown coasts was absolutely dangerous.

It is for these reasons that the voyage of Nearchus from the Indus to the Euphrates, which every skipper of our time could imitate with ease, was at the time of Alexander the Great a real exploit, which was justly considered by his contemporaries as one of the most brilliant deeds wrought by Alexander's followers. The commander was chosen with great care from among the nearest friends of Alexander, by which people were convinced that they were not to take part in an impossible enterprise; and further to encourage the crew, Alexander fitted out the vessels with the greatest luxury. He himself sailed as far as the mouth of the Indus, and before the departure of the fleet made costly offerings to Poseidon and other sea-gods. By day they rowed ahead along the coast, if possible between the islands and the mainland; they lay at anchor o' nights, often for a longer time at the same place in order to repair damaged vessels, in which case ramparts were thrown up around the landing-place. The boldness and wisdom of Nearchus were highly praised, when, on meeting a school of whales, which was discovered while at a distance by the water-spouts which the monsters threw up from the surface of the sea, he saved the fleet by his order that the whales should be attacked with the sound of war-trumpets, cries, and shouts, like a hostile fleet in a sea-fight. To-day a single whaler would hail a similar meeting with joy, and even the Esquimaux would not hesitate to attack the whales from their kayaks.

When, in the year 61 A. D., the Apostle Paul was to be sent as a prisoner from Caesarea in Syria to Rome, the vessel which was to carry him over did not take the direct way across the open sea to Sicily, but first sailed northwards

along the coast of Syria, Cilicia, and Pamphylia, to Myra in Lycia. "And there the centurion found a ship of Alexandria sailing into Italy," and on board this, which was manned with 276 men in all, the voyage was continued. Not even that ship was to sail straight across the sea, but along the land; in fact it intended to skirt the coast, probably in order to cross the Aegean further north among the isles, and afterwards to follow the coast of Greece to the narrow mouth of the Adriatic, where it would sail across to Italy. In consequence of unfavorable winds, the south-west point of Asia Minor at Cnidus could not be passed. They then wished, on account of the late season, to seek a safe winter port in Crete; but not long after there arose a tempestuous north-east wind at the mercy of which the vessel was driven for a fortnight; "neither sun nor stars in many days appeared," and the sailors did not know where they were, until the vessel finally stranded at Malta.

In the year 533 A. D. Justinian, Caesar of the East Roman Empire, sent a well-equipped army of 15 000 men, on 500 ships, manned with 20 000 sailors, from Constantinople to the neighbourhood of Carthage, to make war upon the Vandals. Although the utmost speed was necessary, and although it was difficult to support so many people during a long time at sea, the commander Belisarius did not choose the straight course across the open sea, but sailed or rather rowed, after the Aegean Sea was passed, through the sound between the island of Cythera (Cerigo) and the mainland. Here the great fleet was near to be badly wrecked by reason of collisions between the vessels in the narrow waters. From this point Belisarius shaped his course along the south coast of Laconia to a port in Messenia, where a longer stay was made. After provisions and water had been taken on board there, the voyage was continued to Zacynthus, where water was again taken in; after that, Belisarius steered across the Adriatic to Caucana on the south coast of Sicily, and thence, after a delay of some time, to Malta. From there the fleet was driven by a storm faster than had been expected, though without mishap, to the coast of the present Tunis, where the army was landed. The crossing had taken three months.

These narrations give us a conception of the routes chosen by the sea-farers of olden times. Nevertheless it naturally was no uncommon occurrence for ships to be driven by storm across the sea far from land. Many a time too, hardy free-booters may have preferred this straight way to the way along the coasts, which conflicts with the forces of order were like to render less safe for them. At some places, where the roundabout way was too long, as for instance from Sicily or Sardinia to Africa, the way straight across the sea may have been the habitual one even for trading-vessels. PLINY (VI: 23) says that, in his time, merchants on a voyage from the Red Sea to India had begun to take the direct route straight across the sea, and that this way was less dangerous than that along the coasts. The fact that the open sea was preferred for that commercial route by the sailing vessels of those days, unfit though they were for cruising, depended of course on the regularly changing winds that reign in those waters.

All the same, the chief means of communication by sea consisted of coasting-voyages, to facilitate which sailing-directions were written at an early date. Some of these, more or less completely preserved, are extant from so far back as the 4th or 5th century B. C. The most complete and also the oldest, next to the description of Hanno's remar-

¹ A comparison between rowing-power and steam-power results in the following way, smaller articles of consumption not counted: what is now called one effective horse-power represents from 10 to 11 rowers. One horse-power requires from 1 to 2 kilograms of coal in an hour, when the vessel is in motion. Ten rowers require about 15 kilograms of substantial food in twenty-four hours. If twelve hours' rowing be reckoned for each man, the double set of rowers on a vessel propelled with 50 horse-power, would then require 1 500 kilograms of substantial food in twenty-four hours. The consumption of coal for an equal speed during the same time would amount to 1 200 to 2 400 kilograms. A galley-slave-engine, however, takes more room than a steam-engine; it is more fragile, less lasting, less trustworthy, and the consumption of food is about the same whether the vessel is at rest or at full speed.



2. Map of the world from a MS. of POMONIUS MELA, 1417, in the Library at Reims. From Santarem.

kable voyage along the north-west coast of Africa, is the description of the coasts of the Mediterranean and the Black Sea by SCYLAX, or as the complete title runs: *Σκύλακος Καρυανδέως περίπλους τῆς θαλάσσης τῆς οἰκουμένης Εὐρώπης καὶ Ἀσίας καὶ Λιβύης*, Scylax of Caryanda, his circumnavigation of the sea of the inhabited part of Europe and Asia and Libya.² This periplus possibly served as explanatory text to a map or chart of the Mediterranean and the Black Sea, which, however, is no longer extant, and is not expressly referred to in the text. Neither is it possible to reconstruct the map by the aid of the text, since no bearings are indicated, nor are the direct distances between the ports given but only the distances along the coasts. The text is, nevertheless, so simple and clear, that, without too

great difficulty and without too hazardous interpolations, one can, as Carl Müller has done, mark on a modern map almost all the data given by Scylax. In this way one obtains, as shown in pl. I, a chart that is instructive in many respects; on this plate the outlines of the land are copied from a modern map, but the legends are taken from sailing-directions of the 4th century B. C. The text of Scylax itself is,

in spite of its low literary worth, of such interest as a primaeval type of the portolanos of the Middle Ages and of the sailing-directions of to-day, that I feel compelled to give fairly long extracts from it. I do this the more willingly, since the importance of this document for the history of the oldest cartography has hitherto scarcely been appreciated at its full value. Here we have a reading-chart three times the age of the oldest portolanos, and to some extent rivalling them in completeness.

A definite epoch for the origin of this work can not be fixed with certainty. In its present extent at all events, it was evidently not composed by the Scylax of Caryanda, who according to HERODOTUS (IV: 44)² sailed during the reign of Darius I from the Indus to the Red Sea. For, in various passages of the work there occur, as Niebuhr, Jean François Gail, Letronne, Carl Müller, and others have pointed out, allusions to geographical facts of a later date. Other passages on the contrary, seem to have been written during the 5th and 6th centuries B. C., for in them no attention is paid to the important changes in geographical science which took place at the end of the 4th or 5th century. According to Letronne the circumnavigation of the south of Italy was written at the beginning of the 6th, or at the end of the 5th century, consequently *before* the time of Herodotus. The description of the coasts of Asia Minor, Syria, Egypt, and Libya, on the other hand, dates from the 5th century, while the description of the coasts of Macedonia and Thrace dates from the middle of the 4th. Later on (338—335 B. C. according to Müller, op. cit. I, p. XLIV) these different parts, with some additions, alterations, and improvements, were united, under the name of the best known contributor, into a periplus that included the whole Mare internum.

Probably this work is a set of ancient sailing-directions, which, like the chart of Marinus of Tyre, the portolanos of the Middle Ages, and the Wagheners of the end of the 16th and the beginning of the 17th century, existed in numerous copies or editions, becoming improved bit by bit, and all passing under the name of the celebrated navigator who was the author either of the primaeval type itself or of its more important parts.

The oldest Scylax-codex extant dates from the 12th century, and is preserved in the Bibliothèque nationale at Paris (C. MÜLLER, op. cit. I, p. ix). It is a copy of copies, perhaps to the 10th degree, and it is not to be wondered at, if thereby, as Müller points out, many slips of the pen and alterations have stolen into the text, which at the outset was compiled by an unlearned man and was not very correct. On pl. I. I have rendered the sailing-directions of Scylax, according to Müller, as completely as possible. How far this map corresponds to the original, is shown by the following extracts.

¹ *Geographi graeci minores*, ed. CAROLUS MÜLLERUS, I, Parisiis 1855, pp. 15—96.

² Herodotus says: "But the greater part of Asia was explored by Darius; for he wanted to know where the river Indus, which is the second of all rivers that contain crocodiles, flows into the sea, and for that reason he sent out several men, on whose trustworthiness he could rely, and among them was Scylax of Caryanda. And they started from the city Caspatyrus and the Pactean land, and sailed down the river to the east, till they came to the sea. Thereupon they sailed westward across the sea, and in the thirtieth month they came to the place from which the king of the Egyptians sent the Phoenicians to sail round Libya, as I have before narrated."

II.

The Periplus of Scylax.

"Europe. 1. I shall begin from the Pillars of Hercules in Europe and continue to the Pillars of Hercules in Libya, and as far as the land of the great Ethiopians. The Pillars of Hercules are opposite each other, and are distant from each other by one day's sail. And thereby lie two islands, by name Gadeira [Gades]. Of these the one has a city, which is distant one day's sail from the Pillars of Hercules. Beyond the Pillars of Hercules that are in Europe are many trading-places of the Carthaginians, and mud and tides and open seas.

2. Iberians. In Europe first are the Iberians, the nation of Iberia, and the river Iberus Then a Greek town called Emporium. Its inhabitants are colonists from Massilia. Coasting of Iberia, seven days and seven nights.

3. Ligurians and Iberians. After the Iberians follow Ligurians and Iberians mixed as far as the river Rhodanus. Coasting from Emporium as far as the river Rhodanus, two days and one night.

4. Ligurians. Beyond the river Rhodanus follow Ligurians as far as Antium. In this region is the Greek city Massilia and port, also the Massilian colonies Taurois, Olbia, and Antium. The coasting of this bit from the river Rhodanus to Antium takes four days and nights. From the Pillars of Hercules as far as Antium the whole region is rich in harbours."

In the same way Scylax continues along the coasts of Italy and Greece to the Bosphorus, and from there around the Black Sea, along Asia Minor, Syria, Egypt, and Libya, past the Pillars of Hercules to Cerne on the west coast of Africa. He enumerates the peoples that inhabit the countries along the coasts, states the length of time, in day- and night-journeys, which is needed for sailing past their territories, or the distances along the coasts in stadia, enumerates the principal towns and colonies situated by the sea, specially those of Greek origin, sometimes adding geographical data from the interior of the country, *e. g.*, that the Danube flows into the Black Sea as well as into the Adriatic, or adding some characteristic trait of people or country, *e. g.*, the government by women among the Sauromates, the delicious gardens of the Hesperides. Rome is only mentioned by the way; the future world-capital had evidently, when this part of the Periplus of Scylax was written, not yet attained to any special importance. Finally it is stated in § 69, according to a summing up of the statements of distance previously given, that for sailing along the coast of Europe from the Pillars of Hercules to the mouth of the Tanais, *i. e.*, to the boundary of Asia, 153 days and nights are needed, on the assumption that one sails 500 stadia by day and the same distance by night. Space does not permit a translation of the whole Periplus of Scylax to be given here; neither is that necessary, since the accompanying map (N. T. I.) contains all the essentials of it. But on account of the great interest to geographers, to historians, and not least to geologists,¹ that attaches to the description of the north coast of Africa given by Scylax over 2 000 years ago, I shall quote that part of his sailing-directions in full. Here I may remind my readers that, at the time of Scylax, Africa was called Libya, and that at that time the Nile was considered to form the boundary between Libya and Asia.

"Libya. 107. Libya begins beyond the Canopic mouth of the Nile. Adyrmachidae. The first people in Libya are the Adyrmachidae. From Thonis the voyage to Pharos, a desert island (good harbourage but no drinking-water), is 150 stadia. In Pharos are many harbours. But ships water at the Marian mere, for it is drinkable. It is a short sail from Pharos to the mere. Here is also Chersonesus [peninsula] and harbour: the coasting thither is 200 stadia. Beyond Chersonesus is the bay of Plinthine. The mouth of the bay of Plinthine to Leuce Acte [the white beach], is a day and night's sail; but sailing round by the head of the bay of Plinthine is twice as long. The shores of the bay are inhabited. From Leuce Acte to the harbour of Laodamantium is a half-day's sail. From the harbour of Laodamantium to the harbour of Paraetionium is a half-day's sail. Then comes the city of Apis. As far as this point is governed by the Egyptians.

108. Marmaridae. Beyond Apis is a Libyan people, the Marmaridae, as far as the Hesperides. From Apis to the Tyndarian rocks is a day's sail. And from the Tyndarian rocks to the harbour of Plynus is a day's sail. From Plynus to Great Petras, a half-day's sail. From Petras to Menelaus, a day's sail. From Menelaus to Cyrrhanium, a day's sail. From Cyrrhanium the harbour of Antipygus is a half-day's sail. From Antipygus the harbour of little Petras is a half-day's sail. From little Petras to the harbour of Chersonesi Achilides (this is in the land of the Cyrenians), a day's sail. Half way between Petras and Chersonesus are the islands Aëdonia and Plateae; by these are anchorages. From this point silphium begins to grow in the fields; it extends from Chersonesus through the inner country to the Hesperides, along the shore being about 1 500 stadia at most. Aphrodisias island, anchorage; Naustathmus, harbour. From Chersonesus is one day's sail; but from Naustathmus to the harbour of Cyrene, 100 stadia. But from the harbour to Cyrene, eighty stadia; for Cyrene is inland. These harbours are always fit for putting into. And there are other refuges at little islands, and anchorages and many beaches, in the district between. From the harbour of Cyrene to the harbour near Barcae is 500 stadia. But the city of the Barcaeans is 100 stadia away from the sea. From the harbour near Barcae to the Hesperides is 620 stadia. But between Cyrene and the Hesperides are harbours and the shores are indented; such is the bay of Phycus; above this is the garden of the Hesperides. The place is 18 fathom deep, broken sheer all round, having a descent nowhere, and it is two stadia everyway, not less, in breadth and length and width. The garden is thickly shaded by trees twined in one another in the thickest manner possible. These trees are: lotus-trees, all kinds of apples, pomegranates, pears, arbutus-fruits, mulberry-trees, vines, myrtles, laurels, ivy, olives, oleasters, almond- and walnut-trees.² Among places which have not been spoken of, there are near the garden, Ampelus, Apus (30 stadia from each other), Chersonesus (many gardens), Zenertis, Teuchira, the village of Caucalcus, Hesperides city and harbour, and near the town the river Ecceus. And these places from Chersonesi Achilides to the Hesperides belong some to the Cyrenians, some to the Barcaeans.

¹ For the study of the changes that have taken place on the surface of the earth during historical times.

² The names enumerated by Scylax in the description of these gardens correspond, according to a communication by Dr. A. N. Lundström, docent in botany at the University of Upsala, to: *Ziziphus Lotus* Lam., *Pyrus Malus* L., *Punica Granatum* L., *Pyrus* sp., *Arbutus Unedo* L., *Morus nigra* L., *M. alba* L., *Vitis vinifera* L., *Myrtus communis* L., *Laurus nobilis* L., *Hedera Helix* L., *Olea europaea* L., *O. oleaster* Hfig-Lk., *Amygdalus communis* L., *Juglans regia* L.

109. Nasamones and Macae. After the Hesperides is a large bay, by name Syrtis, which may be put at 5 000 stadia at least. Its width from Hesperides to Neapolis, which lies on the opposite shore, is a three days and nights' sail. Round this there lives a Libyan people, the Nasamones, down to the inmost corner on the left. These are followed by a Libyan people, along the Syrtis and as far as the mouth of the Syrtis, the Macae. Sailing into the Syrtis from the Hesperides, one passes the hills of Hercules. These are followed by Drepanum, the three Pontian islands, and then the so-called White Islands. In the inmost creek of the Syrtis are the altars of Philaenus, a wharf, and a grove of Ammon of the Syrtis. The Macae living beyond this beside the Syrtis winter by the sea, shutting up their cattle; but in the summer, when the water gradually becomes scarce, they drive the cattle up into the interior with them. Beyond the Syrtis there is a beautiful district, and a city, by name Cinyps; but it is deserted. It is 80 stadia distant from Neapolis in the direction of the Syrtis. Near by is the river Cinyps, with an island in front of the mouth. The depth of the Syrtis within the Hesperides, up to the altars of Philaenus at the head of the gulf, is a sail of three days and nights; but the width from the river Cinyps to the White Island, a sail of four days and four nights.

110. Lotophagi. The parts beyond the Syrtis are inhabited by a Libyan people, the Lotophagi, as far as the mouth of the other Syrtis. These use the lotus for food and drink. After Neapolis comes the city of Graphara in the country of the Carthaginians. Sailing there from Neapolis takes one day. After Graphara comes the city and harbour of Arbrotonum. Sailing thither takes one day. After Arbrotonum the city and harbour of Tarichiae. Sailing thither from Arbrotonum, one day. Beyond Tarichiae there is an island named Brachion or the island of the Lotophagi. The island is 300 stadia in length, but its width is a little less. It is about three stadia distant from the main-land. On this island there grows the lotus that they eat, and another, from which they make wine. The fruit of the lotus is as large as the fruit of the arbutus. They also make much oil from wild olives. The island yields good crops, wheat and barley; for the island has a good soil. The sail from Tarichiae to the island is one day. After the island is Gichtis city. From the island to Gichtis is a half-days' sail. From Gichtis [to Macomoda or Neapolis] is a day's sail. And a desert island is hard by this. After this comes Cercinitis island and city; and over against this, Thapsus. The sail from this to Thapsus is a day and a half. Beyond Thapsus, Little Leptis, and Adrymes a great bay bends in, in which is the Little Syrtis, called Cercinitis, much more stormy and difficult to navigate than the Great Syrtis, and its circumference is 2 000 stadia. In this Syrtis there are an island (and a lake), called Triton, and a river Triton, and there is the temple of Athene Tritonis. The lake has a narrow mouth, and an island is close to the mouth, and at times, when the water is low, the lake seems not to have any navigable inlet. But this lake is large, having a circumference of about one thousand stadia. And a Libyan people, the Gyzantes, dwell round it, and a city is on the far side towards the setting sun. These Gyzantian Libyans are said to be fair and all very handsome, and this district is very good and very fertile, and their cattle are very large and very numerous; and they themselves very wealthy. After this Syrtis is Neapolis. It is a day's sail along from Adrymes to Neapolis. After Neapolis the Hermaean cape and city. From Neapolis to Hermaea is a sail of a day and a half. But from Neapolis on foot across the isthmus to the other sea, by Carthage, is 180 stadia. For the promontory is one separated by an isthmus. To sail

along from the river at this place to Carthage takes half a day. But the district of the Carthaginians is in a bay.

111. Carthage. After the isthmus is Carthage, a city of the Phoenicians and a harbour. Sailing along from Hermaea it is half a day to Carthage. There are islands off the Hermaean cape, Pontia island and Cosyrus. From Hermaea to Cosyrus is a day's sail. Beyond the Hermaean cape, towards the rising sun, are three small islands belonging to this shore, inhabited by Carthaginians: the city and harbour of Melite, the city of Gaulus, and Lampas; this has two or three towers. But from Cosyrus to the Lilybaean promontory in Sicily is one day's sail. After Carthage is the city of Ityke [Utica] with a harbour. Sailing along from Carthage to Ityke takes one day. After Ityke follows Hippuacra, or the city of Hippo, and there is a marsh near it, and islands in the marsh, and around the marsh are cities, as follow: Pseegas city and opposite it the many Naxican islands; Pithecusae and harbour; and opposite it the island and city on the island, Euboea; Thapsa, both city and harbour; Caucacis, city and harbour; Sida city; Iol, cape, city and harbour; Hebdomus, city and harbour; the island of Acium with a city and harbour; Psamathus, island, city and harbour; then a bay. In the bay is Bartas island and harbour; Chalca city on the river; Arylon city; Mes, city and harbour; Sige city on the river, and off the mouth of the river the island of Acra; a large city and harbour (Acrus is the city and the bay next to it); a desert island, Drinaupa by name; the Pillar of Hercules in Libya; cape Abilyce with a city on the river, and opposite this the Gadeira islands. From Carthage hither to the pillars of Hercules with most favourable navigation is a seven days and seven nights' sail. Gadeira. These islands are near Europe, and of them the one has a city. Opposite them are the pillars of Hercules, the one in Libya being low, but that in Europe being lofty. Now these are capes opposite each other, and they are separated from each other by a day's sail. The sailing along Libya from the Canopic mouth in Egypt to the pillars of Hercules, reckoning being made according to that described in Asia and in Europe,¹ takes 74 days if one coast round the bays. Such towns and ports as have been described in Libya, from the Syrtis that is by the Hesperides as far as the pillars of Hercules in Libya, all belong to the Carthaginians.

112. Beyond the pillars of Hercules, sailing into the outer sea, having Libya to the left, one comes to a large bay as far as the Hermaean cape; for here too there is a Hermaean cape. At the middle of the bay lies the place and city of Pontion. Round the city lies a great mere, and in this mere lie many islands. Around the mere grow cane, cyperus, reeds (*φλέως*), and rushes.² There are also a kind of peacock, which are not to be found elsewhere unless they are imported from here. This mere is named Cephesias, but the bay Cotes. It lies midway between the pillars of Hercules and the cape of Hermaea. From the cape of Hermaea extend great reefs, that is, from Libya towards Europe, not rising above the sea; it washes over them at times. This reef extends towards another cape of Europe right opposite. This cape is named the Holy promontory. Beyond the cape of Hermaea is a river Anides; this runs out into a large mere. After Anides is another great river — Lixus, and a city of the Phoenicians — Lixus, and another city of the Libyans is on the other side of the river with a harbour. After Lixus the river Crabis, with a harbour and a city of the Phoenicians, Thymiateria by name. From Thymiateria one sails to cape Soloes, which juts far into the sea. But all this district of Libya is very famous and very sacred. And on the point of the cape there is a great altar consecrated to Poseidon, and on the altar are engraved figures of men, lions, dolphins.

¹ I. e. a night-sail is taken as equal to a day-sail or to a distance of 500 stadia.

² *Arundo Donax* L., *Cyperus aureus* Ten(?), *Arundo Ampelodesmos* Cyr., *Juncus* sp. (Compare the preceding page, note 2.)

It is said to be the work of Daedalus. Beyond cape Soloes is a river by name Xion. Around this river dwell the sacred [Hesperian] Ethiopians. Outside there is an island by name Cerne. Coasting from the pillars of Hercules to cape Hermaea is two days; but from cape Hermaea to cape Soloes coasting is three days; and from Soloes to Cerne, seven days' coasting. This whole coasting from the pillars of Hercules to Cerne Island takes twelve days. The parts beyond the isle of Cerne are no longer navigable because of shoals, mud, and sea-weed. This sea-weed has the width of a palm, and is sharp towards the points, so as to prick. The traders here are Phoenicians. When they arrive at the island of Cerne, they anchor their cargo-boats, and pitch tents for themselves on Cerne. Then they unload and ferry their merchandise in small boats to the mainland. They are Ethiopians on the mainland; and it is with these Ethiopians that they trade. They exchange their wares for the skins of deer, and lions, and leopards, and skins and teeth of elephants, and of tame cattle. The Ethiopians use as an ornament speckled skins, and drinking-cups of ivory as goblets, and their women use as an ornament armlets of ivory; even the horses are adorned with ivory. And these Ethiopians are the tallest of all people we know, greater than four cubits; some are even five cubits; and they wear a beard and long hair and are the most handsome of all people. And he rules them who happens to be the tallest. They are also trained horse-men, javelin-throwers, and archers, and use missiles hardened by means of burning. The Phoenician merchants import to them ointment, Egyptian stone, Attic earthenware, and vessels for measuring. These Ethiopians are flesh-eaters and milk-drinkers, and they make much wine from grapes, and this the Phoenicians export. They have also a great city, to which the Phoenician merchants sail, and some say that these Ethiopians stretch right along inhabiting the country thence to Egypt, and that this sea is continuous, and that Libya is a peninsula."

A glance at the accompanying map (N. T. I.), which depicts all the region included in the Periplus of Scylax, seems to me to show clearly that this work was intended as a guide to sea-farers in the Black Sea and the Mediterranean, and that it was formed by putting together various peripli from smaller districts. Most of these may have been of Greek or Graeco-Phoenician origin. The real author of the sailing-directions here in question, evidently was, if not from Caryanda, at all events from some Greek town on the Aegæan Sea. Already the northern part of the Adriatic was only partially known to the Greeks of the time, as can be seen from the statement that the Ister flows into the Black Sea as well as into the Adriatic. On the coasts of Spain and France only the Greek colonies, Emporion (the present Ampurias) and Massilia, are alluded to; but "there were many good harbours." On the other hand, the coasts of the Black Sea, Asia Minor, and Syria, and those of Egypt and Cyrene were well known. Already then Greece had brisk communication with these regions. Moreover, for the Carthaginian kingdom in Africa, from the altars of Philaenus to Cerne, fairly detailed accounts are given, showing that Carthaginian sources too were at the author's disposal. The statement of the sailing distance from Sicily to Libya may have been derived from this source, also the few statements which are here given of land-roads in Africa. Otherwise only the distance from coast-town to coast-town is given, and the choice of places mentioned may well have been de-

² HERODOTUS says (I: 163), that the Phocians were the first Hellenes to use galleys, and to give an account of the Adriatic, Tyrrhenia, and Iberia and Tartessus. They did not sail in round ships, but in fifty-oared vessels; and they made such great friends with the king of the Tartessians that he gave them the means of enclosing their town with a wall.

³ The coast distances are measured along the coasts, but across smaller bays from point to point.

⁴ Scylax reckons that a vessel with fair wind can make 500 stadia a day and as much in the night, consequently 1000 stadia in one day and night, or 42 stadia, i. e., 4.2 an hour.

terminated in the first place by their importance as harbours and markets. For the sea-farers of that time, as well as for those of the Middle Ages, an insignificant village with good anchorage and access to fresh water had greater importance than a great and politically powerful town without a harbour. The following tables serve as a guide in estimating the distances given by Scylax, partly in stadia partly in sailing time.

I. Distances which the Periplus of Scylax gives in stadia.²

	The distances of Scylax. Stadia.	Real distances. Minutes.
The width of the mouth of the Adriatic	500	44'
The coast of Elis	700	60'
The coast of Arcadia & Messenia	400	39'
The eastmost point of Peloponnesus to the river Iapis	740	77'
Iapis to Sunium	490	40'
Sunium to the boundary between Attica & Boeotia	650	60'
The boundary between Attica & Boeotia to Thermopylae	650	72'
Cardia to Elaeus	400	48'
Orontes to Ascalon	2 700	270'
Ascalon to the Canopic mouth of the Nile	2 500	250'
The circumference of Sicily	4 500	470'
Total	14 230	1 430'

Like the mile-measure, the old stadium-measure is variable in itself as well as in relation to the size attributed to the globe. Thus a distinction was drawn between Pythian, Olympic, Greek, Alexandrine, and Italian stadia. Eratosthenes reckoned one degree at 700 stadia, Eudoxus at 770 stadia, Ptolemy at 500 stadia. It is therefore difficult to settle *a priori* what distance Scylax intended by the term *stadion*. Meanwhile one sees from the table that in Scylax 600 stadia roughly correspond to a degree of latitude on the surface of the earth, or 10 stadia = 1°. The average of all the statements of distance corresponds exactly to this number. On this assumption the individual statements become, no doubt, more or less erroneous; but the errors appear remarkably small, when it is remembered on the one hand that the statements of Scylax are based only on guesses, and on the other hand that the measurement of them on a modern map, in most cases *along the coasts*, carries with it great uncertainty.

II. Distances which the Periplus of Scylax gives in time of sailing.

	According to Scylax.		Real distances.
	Sailing time.	Stadia. ³	
The Pillars of Hercules to Emporium	7 d. + 7 n.	7 000	630'
Emporium to Rhodanus	2 d. + 1 n.	1 500	135'
Rhodanus to Rome	8 d. + 8 n.	8 000	495'
Rome to Croton	9 d. + 6 n.	7 500	510'
Croton to Eridanus (the Po)	10 d. + 8 n.	9 000	660'
Eridanus to Epidamnus	9 d. + 2 n.	5 500	570'
The coast of Laconia	3 d.	1 500	180'
The coast of Macedonia	2 d. + 2 n.	2 000	130'
Strymon to Sestus	2 d. + 2 n.	2 000	140'
Sestus to the mouth of Pontus	2 d. + 2 n.	2 000	125'
The mouth of Pontus to the Ister	3 d. + 3 n.	3 000	240'
Ister along the coast to Criumetopon	6 d. + 6 n.	6 000	360'
Ister direct to Criumetopon	3 d. + 3 n.	3 000	180'
Hesperides across the Great Syrtis to Neapolis (Africa)	3 d. + 3 n.	3 000	300'
Hesperides along the coast to Neapolis	7 d. + 7 n.	7 000	450'
Carthage to the Pillars of Hercules	7 d. + 7 n.	7 000	780'
Sardinia to Africa	1 d. + 1 n.	1 000	95'
Sardinia to Sicily	2 d. + 1 n.	1 500	150'
Total	86 d. + 69 n.	77 500	6 130'

On an average, as the above table shows, 12 hours' sailing comes, as near as may be, to 40', and not, as Scylax supposed, to 500 stadia or 50'. A day and night's sail corresponds to a distance of 800 stadia or 80', which is equivalent to 3.3 an hour.¹ Nowadays, for vessels of moderately good sailing-powers one can reckon on an average speed of 4' to 5' an hour, throughout a lengthy voyage. The difference in rate of sailing between then and now is therefore not so great as one would have expected. But here it should be remem-

bered that the sailing-distances given by Scylax only refer to sailing or rowing with a fair wind and under favourable circumstances, and that the vessels of antiquity, manned by a numerous crew of rowers, ought rather to be compared to inferior steam-boats than to real sailing-ships, which latter in contrary winds are obliged to tack on their course, and generally have no time to wait in port for a fair and following breeze.

III.

Maps and sailing-directions from the 2nd century A. D. down to the crusades.

In the preface to an abstract of the sailing-directions of Menippus for the inner sea i. e. the Mediterranean and the Black Sea, MARCIANUS, who probably lived in the 5th century A. D., says:²

"This I write after having gone through many sailing-directions (*περίπλοι*) and spent much time on their examination. For it behoves all who are men of education, to scrutinise such attempts at learning in this subject, so as neither rashly to believe the things that are said, nor incredulously to set their private opinions against the careful decisions of others. We shall therefore consider the following writers in closer detail, for they seem to have scrutinised these subjects in a reasonable manner: Timosthenes the Rhodian, who became the chief pilot of the second Ptolemy; and next to him Eratosthenes, whom the keepers of the [Alexandrian] Museum called Beta; and after these Pytheas the Massilian, Isidorus of Charax, and the pilot Sosander, who wrote about India, and Simmeas, the author of a periplus of the world; besides them, Apellas of Cyrene, Euthymenes the Massilian, Phileas the Athenian, Androsthenes the Thasian, Cleon the Sicilian, Eudoxus the Rhodian, and Hanno the Carthaginian, some of whom have written sailing-directions for certain parts, others for the whole of the inner sea, others for the whole of the outer. Further, I mention Scylax of Caryanda and Botthaeus, who both explained the distances by sea in daily sailings, not in stadia.³ Many others there are too, whom I consider it superfluous to enumerate. Later than most of these were Artemidorus, the Ephesian geographer, and Strabo, who have composed both geographical works and periplus, and Menippus of Pergamus, the describer of direct voyages over the sea: these seem to be more accurate than all those previously mentioned."

Marcianus, after assigning detailed reasons for his opinions, one of which is that Eratosthenes plagiarized text as well as preface from Timosthenes, proceeds to enquire the reason for the discrepancy that occurs in the statements of distance. "It is easily explained", he says, "when the question

is one of distances in coasting. Here the length of the course traversed by a sailing-vessel depends on the distance of the course from land. On the other hand, the discrepancy in the statements of direct sailing from one place to another is more difficult to explain. It depends perhaps on the fact that the sailing-speed of the vessels is very variable. Generally a vessel with favourable wind can make 700 stadia in one day, but skilful masters have built ships that have made 900 stadia in the same time. Other vessels, again, of inferior construction, can only reach a speed of 500 stadia a day."

We have here a list of ancient hydrographers and explorers most of whom belonged to the pre-Christian Era. They lived consequently more than four hundred years before Marcianus. Moreover, with but few exceptions, we have no knowledge of their persons or their works. Geographers are glad to read the name of Pytheas in this list. This may be regarded as a defence against the depreciatory judgement of Strabo concerning the love of truth of this first arctic traveller. It is significant that among authors referred to by Marcianus, there occur only names from Greece and Greek colonies, with the exception of Hanno, the Carthaginian. The part which Italy played in the development of navigation during ancient times was evidently quite a small one.

That the great Strabo, with his philosophic gifts, should have written a real periplus or sailing-direction is little likely; at any rate he is not known to have done so. Marcianus in his remarks on Strabo refers more probably to the fact that in sundry passages of his Geography are indications that coast-descriptions by skippers served as material for this the most perfect geographical work of antiquity.

Latin literature itself does not contain either any sailing-directions or such works as Scylax' Periplus or the Stadiasmus. It is moreover very significant, that all those hydrographers referred to by the compiler of the 5th century lived, or at least were born, before the downfall of the Roman republic and the extension of the Roman empire over all the countries of the Mediterranean and the Black Sea; consequently the

¹ HERODOTUS states (IV: 86), that a vessel makes 70 000 fathoms in a long day and 60 000 in a night, and counts 100 fathoms to the stadium. He thus supposes a run of 1 300 stadia for one day and night, which corresponds to 5.4 an hour. This amount is calculated from the time required to sail across the Black Sea, but depends on an over-estimate of the size of that sea. Its greatest length "from the mouth of Pontus to Phasis" ought, according to Herodotus, to be 11 100 stadia. In reality the long axis of the Black Sea from Burgas to Poti is about 600' or 6 000 stadia, and therefore little more than half of the figure Herodotus gives, so that the rate of sailing in his time (5th century B. C.) was scarcely 3' an hour. — MARCIANUS (C. MÜLLER, op. cit. I, p. 568) puts the rate of sailing with a fair wind at 500 to 900 stadia a day, and, supposing the "day" means 12 hours, this makes 4.2 to 7.5 an hour. — PORCACCHI says in the last chapter of *L'isole piu famose del mondo*, Venetia 1572: "Dicono i pratici, che il maggior corso che possa fare una nave, è sedici miglia l'hora: dodici miglia è buon corso: et otto è ragionevole." The statement seems, however, to be considerably exaggerated, for Porcacchi reckons (p. 113) 17.5 "leghe" to one degree and 4 "miglia" to one "lega." One "miglio" thus equals 0.86, and the rate of sailing = 6.9 to 13.8 an hour.

² *Μαρκιανού Ἡρακλείτου τοῦ Πόντου Ἐπιτομή τοῦ τῆς ἐντὸς Θαλάσσης περιπλου, ὃν ἔγραψεν ἐν τρισὶ βιβλίοις Μενίππος Περραμηνός*. Of this work there are extant, besides the preface, only insignificant fragments. (C. MÜLLER, op. cit. I, pp. 563—573.)

³ In the periplus, which now goes under the name of Scylax, the distances are given partly in times of sailing, partly in stadia. Probably, as I have before suggested, different works have here been joined under a general title.

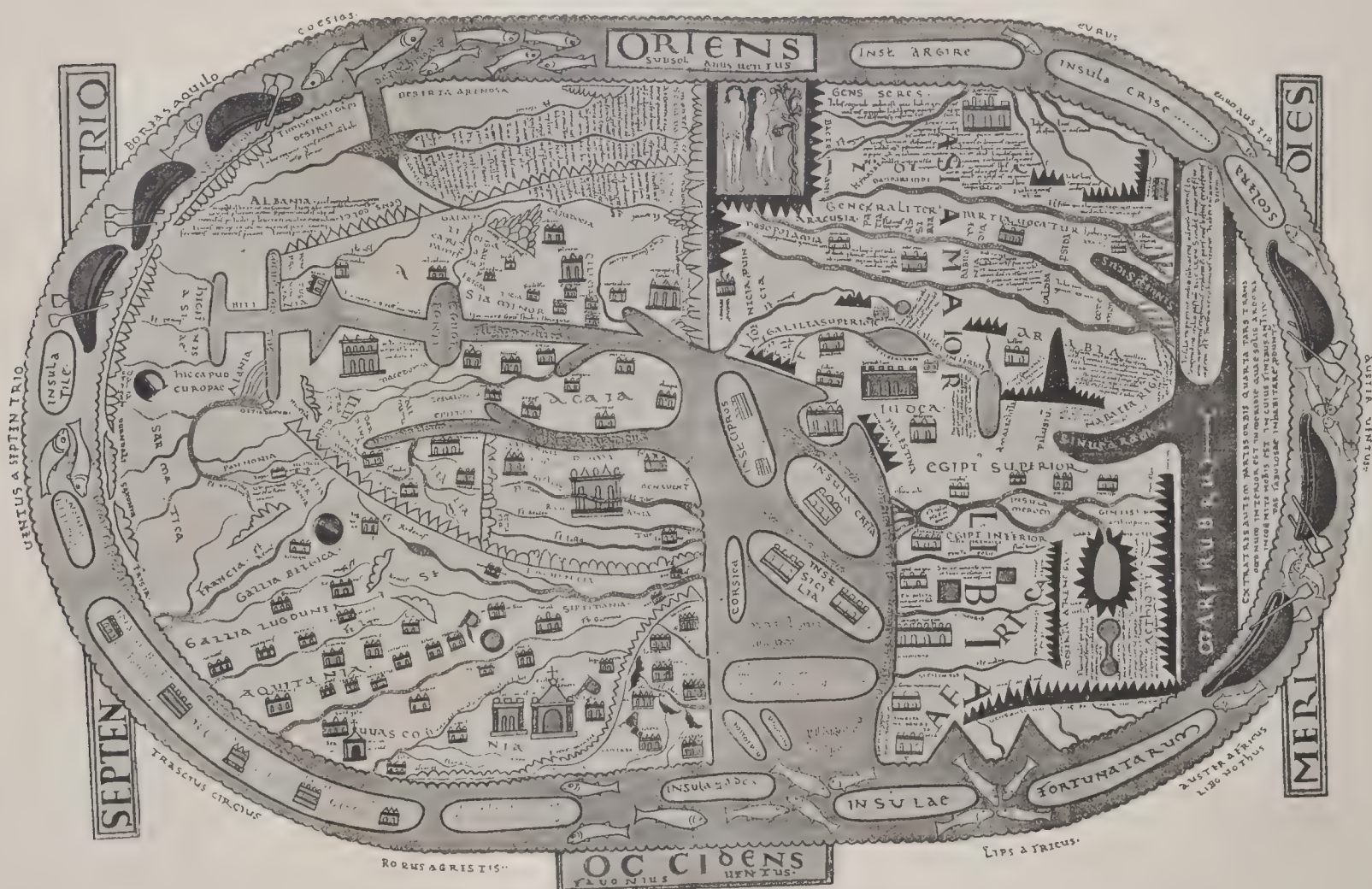
He has evidently here stumbled on the same difficulties as make it almost impossible to refer undated portolanos even to their proper century, *e. g.* the Tammur Luxoros and Upsala portolanos. For instance, among the evidences of date Müller quotes the fact that Salamis is counted among the towns of Cyprus, although this town was destroyed by an earthquake in the time of Constantine the Great and afterwards rebuilt under the name of Constantia. But on a map of Cyprus (N. fig. 4) rich in names, which was engraved on wood and printed in Venice by MATHEO PAGANO in 1538, this town is denoted by the name *Famagosta alias Salamis*. It seems therefore that the old name gave way to the new one, dictated by flattery, only for a time, and perhaps only in official charters. In any case it seems probable that the *Stadiasmus* was compiled in the time of the Roman emperors after Marinus and Ptolemy.

In order to give the reader some conception of a sailing-direction of that time I shall give here some extracts from it.

how they loom to the navigator, with what winds they ought to be put into, and the character of the passage by them. Then follows the statement of the distances by sea.

The distances by sea (Σταδιασμός τῆς Θαλάσσης).

- 1, 2. From Alexandria, sailing westward, to Chersonesus — there is a harbour for smaller vessels — 70 stadia.
3. From Chersonesus to Plinthine — there is a roadstead; the place lacks a harbour — 90 stadia.
4. From Plinthine to Taposiris — a town without a port; temple of Osiris — 90 stadia.
5. From Taposiris to Chimo — this is a village; shallows visible above the surface of the water — 90 stadia.
6. From Chimo to Glaucus, 80 stadia.
7. From Glaucus to Antiphræ — the place has a roadstead — 80 stadia.
8. From Antiphræ to Derra — there is anchorage during the summer, and the place has water — 90 stadia.



3. Map of the world by BEATUS, 8th century A. D. From Konrad Miller. (Orig. size 0.578 x 0.371 m.)

I do this the more willingly, as the *Stadiasmus* is not only of interest for the history of navigation, but also, like the *Periplus of Scylax*, is likely to contain various points of importance in our study of the changes that have taken place on the globe during historic times.

The *Stadiasmus* or circumnavigation of the great sea.

In the preface the anonymous author announces that he intends to present an exceedingly exact *stadiasmus* or *periplus* of "the great sea." Beginning at Alexandria, he will first describe the coast of Libya, afterwards from the same starting-point the coast of Asia to the entrance of Pontus, and further the coasts of Europe down to the Pillars of Hercules and Gadeira. He intends also to give a statement of the distances that separate Asia from Europe, to indicate the mutual distances of the islands, how many and how large they are,

9. From Derra to Zephyrium — the place has a harbour and roadstead — 170 stadia.

10. From Zephyrium to Pedone, 110 stadia. Off here is a rock, called Myrmex, and a promontory which is called Tracheia.

11. From Pedone to Pnigeus, 90 stadia. It is a low promontory, on the right you come to rocky shallows.

12. From Pnigeus to Phoenicus, 140 stadia. Here are the islets Didyma; anchorage by them, with depth for cargo-boats, there is water in a cistern in the ravine.

13. From Phoenicus to Hermaea, 90 stadia; anchor with the cape on your right; the place has water in a tower.

14. From Hermaea to Leuce Acte, 20 stadia; hereby lies a low islet at a distance of two stadia from the land; there is anchorage for cargo-boats, to be put into with west wind; but by the shore below the promontory is a wide anchoring-road

for all kinds of vessels. Temple of Apollo, a famous oracle; by the temple there is water.

15. From Leuce Acte to Zygris, 90 stadia; there is an islet; put into the place with it on your left; there is water in the sand.

16. From Zygris to Ladamantia, 20 stadia; close by lies a rather large island; put in with this on your right. There is a harbour, accessible with every wind; water is to be had.

17. From Ladamantia to Calamaeus, 40 stadia. It is a promontory, having a rock on its right, with anchorage.

18. From Calamaeus to the Hag's Knee, 70 stadia. It is a rugged cape with a rock on the summit; on the shore there is a tree; there is anchorage, and beneath the tree there is water. Ware south wind!

19. From the Hag's Knee to Artus 120 stadia. This is a rugged promontory, having no anchorage, and on the promontory are two horns, stretching out like islands in the sea. Having doubled this, you see the city Paraetionium. The total stadia from Alexandria to Paraetionium come to 1550.

20. From Paraetionium to the Dolphin-islands and Zephyrium, 90 stadia; here are two islands and a promontory; there is a harbour accessible with all winds; and water is to be had.

21. From Zephyrium and the Dolphin-islands to Apis, 30 stadia. This is a village with an anchorage; there is water in the village.

22. From Apis to the islands, 90 stadia.

23. From the islands to Selenis, 70 stadia. Here is a point with anchorage; but there are shoals on the right; put in when these are visible.

24. From Selenis to Azy, 50 stadia.

25. From Azy to the Tyndarii, 120 stadia; these are cliffs; under them cargo-ships can cast anchor.

26. From the Tyndarian cliffs to Chautaeum, 140 stadia. Here is anchorage for small vessels; there is water, which comes up from springs in the fields.

27. From Chautaeum to Zygrae, 140 stadia.

28. From Zygrae to Ennesyphora, 210 stadia. Here is a summer anchorage; there is water in the sand, and by the sea a rock.

29. From Ennesyphora to Catabathmus, 250 stadia. The district is lofty; there is a port, accessible with all winds; there is water in the first dell towards the southern part; in the fort is rain-water.

30. From Catabathmus to [Great] Petras, 150 stadia. Having sailed past as much as 30 stadia, you will see in the offing a lofty and large point, and by this you will see a roadstead and a large mere; to the left is an artificial basin. There is water under the fig-tree, wherefore the place also is called Syce [Ficus].

31. From Syce to Panormus, 30 stadia; there is a deep glen; there is remarkably good water under the fig-trees.

32. From Panormus to Eura [or the Broad], 50 stadia; it is a ravine, and within it a beach, and on this are fig-trees; the anchorage is fine and has sweet water.

33. From Eura to Petras [40 stadia]; here is much water on both sides. The distance from Alexandria to Petras amounts to 2890 stadia.

In this way continues, as is promised in the preface, the account of the sailing along the coast of Africa, and then from Alexandria along the coast of Asia and Europe to Gades, of the distances between the islands in the Archipelago, etc. A great part of the work, however, has been lost. Of what is left, I will, as a sample of the special periplus incorporated in the Stadiasmus, give the coast-descriptions of Cyprus and Crete, also, for the determination of the length of the stadium, a comparison between some of the statements of distance occurring in it and the actual distances.

The circumnavigation of Cyprus.

297. From Acamas, with Cyprus to the left, to Paphos, 300 stadia; the city is situated towards the south; it has a triple harbour, accessible with all winds, and a temple of Aphrodite.

298. From Paphos to Numenium — an island with a spring; the crossing short; when you have approached the islet, hug the land on the right — 55 stadia.

299. From Numenium to Palaepaphos, 25 stadia.

300. From Palaepaphos to Tretoi — it is a promontory — 50 stadia.

301. From Tretoi to Curiacum . . stadia.

302. From Curiacum to Amathos, 150 stadia; this is a city without a harbour; beware of the place.

303. From Curiacum to Cargaeae, 40 stadia; this is a promontory with a fort, anchorage, and water

304. From Pedalium to the islands, 80 stadia. There is a deserted town, called Ammochostus; it has a harbour, accessible with all winds, but with low rocks in the entrance; keep a look out!

305. From the islands to Salamis, 50 stadia; this is a city; it has a harbour.

305. a. From Salamis to Palaea, 120 stadia; this is a village; and it has a harbour and water.

306. From Palaea to Phileos, 300 stadia.

307. From Phileos to the Heads, 60 stadia; here are two anchorages, the one light-blue, the other white, both with fresh water. Above lies the temple of Aphrodite; and outside lie two islands, which both have landing-places.

308. From Anemurium in Cilicia to Acamas in Cyprus, 700 stadia.

309. From Acamas, with Cyprus on the right, to Arsinoë of Cyprus, 70 stadia. This is a city, it has a deserted port exposed to the north wind.

310. From Crommyacus to Melabrum, 50 stadia; here is a summer anchorage.

311. From Melabrum to Soloi, 300 stadia. This is a city without a harbour.

312. From Soloi to Cerynea, 350 stadia. This is a city with an anchorage.

313. From Cerynea to Lapathus, 50 stadia. This is a city with an anchorage.

314. From Lapathus to Carpasia, 350 stadia. This is a city; it has a harbour for small vessels. It is exposed to the north-wind.

315. From Carpasia to Acra, 100 stadia. From here we cross to Anemurium. The whole circumnavigation of Cyprus, 3250 stadia.

316. From the same Curiacum to Pelusium, 2300 stadia.

317. And from Citium in Cyprus to Ascalon, 3300 stadia.

The circumnavigation of Crete.

318. From Casus to Samonium in Crete, 300 stadia; this is a promontory in Crete, which extends far to the north; there is a temple of Athene; it has an anchorage and water; the rest is destroyed.

319. From Samonium to Hierapydna, 480 stadia; this is a city; it has an anchorage, it has also an island, which is called Chrysea; it has a harbour and water.

320. From Hierapydna to Bienus, 170 stadia. It is a small town, at a distance from the sea.

321. From Bienus to Lebena, 270 stadia. Thereby lies an island, which is called Oxeia; it has water.

322. From Lebena to Halae, 50 stadia.

323. From Halae to Matala, 80 stadia. This is a city and has a harbour.

324. From Matala to Sulia, 65 stadia. This is a cape which extends to the south; there is a harbour; it has good water.

325. From Sulena (Sulia?) to Psychium, 12 stadia; but from Pydna to Psychium, 550 stadia. This is a summer harbour, and has water.

326. From Psychium to Lamon, 150 stadia. This is a harbour, and has a city and water.

327. From Lamon to Apollonias, 30 stadia.

328. From Apollonias to Phoenix, 100 stadia. This is a city; it has a harbour and an island. From the isle of Claudia to Phoenix, 300 stadia. It has a city and harbour.

329. From Phoenix to Tarrha, 160 stadia. This is a small city; it has anchorage.

330. From Tarrha to Poecilassus, 60 stadia. It is a city, and has anchorage and water.

331. From Poecilassus to Syba, 50 stadia. It is a city, and has a fine harbour.

332. [From Syba to Lissus, 30 stadia.]

333. From Lissus to Calamyde, 50 stadia.

339. From Agnium to Cisamus, 80 stadia. There is a town, lying in a bay; there is a harbour; it also has water.

340. From Cisamus to Tityrus, 25 stadia. This is a lofty, wooded promontory; it looks to the north.

341. From Tityrus to Dictynnaeum, 80 stadia. There is anchorage by a beach.

342. From Dictynnaeum to Coete, 170 stadia. It is an island, it has anchorage and water. It looks towards Crete and the north.

343. From Coete to Cydonia, 60 stadia. It is a city; it has a harbour and in the entrance are shoals.

344. From Cydonia to the Aptera district coasting is 150 stadia, but on foot, 120 stadia; the place is called Minos. By it lie three islands, which are called the White Islands.

345. From Minos to Amphimatrium [Amphimalium?], 150 stadia. It is a river, and round it is a harbour fit for winter quarters; here is also a tower.



4. Map of Cyprus by MATHEO PAGANO, Venetia 1538. (Orig. size 0.401 x 0.560 m.)

334. From Calamyde to Criu-Metopon, 30 stadia. It is a lofty promontory; it has water and an anchoring-place.

335. Coasting from Criu-Metopon to Biennus, 12 stadia. It has a harbour and water.

336. From Biennus to Phalassarna, 160 stadia. There is an anchorage, commercial centre, and an old city. At a distance of 60 stadia is the isle of Iusagura, looking to the east; it has a harbour, and by the harbour a temple of Apollo. There is also another island at a distance of three stadia; it is called Mese and has an anchorage. And the third is called Myle; the water-way is deep; here is a market-place.

337. From Myle to Tretum, 50 stadia. This is a steep and rugged promontory of Crete, pierced by a gap.

338. From Tretum to Agnium, 50 stadia. This is a harbour with a temple of Apollo. There is an inner bay, which is called Myrtilus. There is water also.

A. E. N. II.

346. From Amphimatrium to Hydramus [30 stadia, thence to Rithymna, 100 stadia; thence to Pantomatrium], 100 stadia; it is a city; it has a beach. [Within lies Eleutherna.] The way up on foot from Amphimatrium is 50 stadia.

347. From Amphimatrium [Pantomatrium?] to Astale, 30 stadia. To the left is a harbour; it has water.

348. From Astale to Heracleum, 300 stadia. It is a city; it has a harbour and water. At a distance of 20 stadia lies the city of Cnosus. Towards the west at a distance of 40 stadia lies an island, which is called Dios.

349. From Herculeum to the city of Cherronesus, 130 stadia. It has water, and an island with a tower and harbour.

350. From Cherronesus to Olus, 260 stadia. This is a point; it has an anchoring-place and good water. At a distance from the land of 20 stadia [there is a small island].

351. From Olus to Camara, 15 stadia.

352. From Camara to Istrum, 25 stadia.

353. From Istrum to the cape of Cetia, 15 [150?] stadia. There is an anchoring-place but it lacks water.
354. From the cape of Cetia to the Dionysiades, 300 [80?] stadia. There are two islands with a harbour and water.
355. From the Dionysiades to Samonium, whence we began our journey round Crete, 120 stadia.

As a sample of the exactness of the distances as stated in the *Stadiasmus* the following table may be given:

Statements of distance in the Stadiasmus.

	Stadia according to the <i>Stadiasmus</i> .	True distance along the coast.
Alexandria—Paraetionium (Berek)	1 550	155'
Paraetionium—Great Petras (Bardia)	1 340	133'
Great Petras—Apollonia (Susa)	2 210	195'
Apollonia—Berenice (Bengasi)	1 032	114'
Berenice—the altars of Philaenus (Muktar)	1 787	150'
The altars of Philaenus—Neapolis (Lebda)	3 090	297'
Neapolis—Carthage	5 850	595'
Total	16 859	1 639'

On an average, a minute thus corresponds to 10.3 stadia in the *Stadiasmus*, which relation, considering the uncertainty which necessarily attaches to distances measured along the coast, may be roundly stated as: 10 stadia of the *Stadiasmus* = 1', or 600 stadia = 1 degree of latitude. So that about the same sea-stadia were used in both Scylax and the *Stadiasmus*.

Besides the sailing-directions for the *inner* or *great sea* i. e. the Mediterranean and Black Sea, of which I have just given an account, there are also, as already indicated on p. 10, peripli of the *outer sea*, i. e. those parts of the Atlantic and Indian oceans which were known during Greek and Roman times. But, if one excepts the rather worthless sailing-direction of the outer sea by MARCIANUS, compiled principally from the maps of Ptolemy, these peripli have rather the character of descriptions of voyages and trade-reports than sailing-directions for navigators. I shall therefore not dwell upon them here; but, later on, when dealing with the extension of navigation by the civilised countries beyond the Pillars of Hercules and the Isthmus of Suez, I intend to pay proper attention to even these peripli of the outer seas.

If the *Stadiasmus* really is a work written or compiled in the 4th or 5th century, then it is the last contribution from Greek literature to navigators' guides for the inner sea. Certainly there are still extant divers other geographical works, chiefly by Greek authors, from the 4th to the 12th century; but those are partly rather worthless compilations of land-geography after Ptolemy and Strabo or other classical authors, often written in rhymed form, partly collections of geographical fables, resting on a basis of christian theology of no critical or scientific value. The geographer, it is true, may find here, among worthless plagiarisms, pious legends, and naive tales, sundry matters to interest him; the historian of culture will find exceeding much; but no contribution to the literature of navigation is to be found either in these works or in the maps accompanying them. These latter are, as shown by the maps given here (figg. 3 and 5) and in my above quoted Facsimile-atlas (fig. 17), almost arbitrary fancy-pictures, of which it is difficult to explain the

¹ KONRAD KRETSCHMER (*Marino Sanudo der Ältere und die Karten des Petrus Vesconte. Zeitschr. d. Gesellsch. f. Erdk. zu Berlin, XXVI, 1891*) maintains that the maps occurring in the work of Sanudo, some of which have been printed in BONGARS' *Gesta Dei per Francos*, Hanoviae 1611, are drawn by Vesconte. Walsperger's map of the world was discovered by Kretschmer in the Vatican library (*Eine neue mittelalterliche Weltkarte der vatikanischen Bibliothek. Ibid.*)

² J. DE BARROS: *Asia*, Venetia 1562 (first Portuguese edition printed in 1552), part I, book IV, chapter 6.

origin during a period when Ptolemy does not seem to have been forgotten, and when preliminary works for the normal portolano evidently were being undertaken by unlearned skippers.

The same is the case as regards the geographical literature of the Arabs, however excellent it may have been considered by the connoisseurs. For this I must refer to the above quoted works of LELEWEL and VIVIEN DE ST. MARTIN, and to the monographs mentioned therein. As regards the Arabian maps reproduced in Lelewel's atlas, I have, however, to point out that they are perfectly misleading. The "Horismos quadrantis habitabilis anonymi khwarezmii, tabula almuniana 833", "Khasdai Ben Isaak Ibn Sprot," "Abulhassan Ali Ibn Iunis, Aegyptius 1008," and others given by Lelewel, are nothing more than his own reconstructions based on these authors' statements of latitude and longitude, which, when necessary, have been corrected with the help of the geographical knowledge of the 19th century. The manner in which these "Arabian" maps have been made is not stated either on the maps or in the table of contents of Lelewel's atlas. Many geographers have, in consequence, taken them for representations of the earth really dating from the time of the Arabs, although they have next to nothing to do with Arabian cartography.

What the real Arabian maps looked like, may be seen from the third plate of Lelewel's work. Such representations of the earth mark no progress in cartography, not even when compared with the similar works by the pious monks of the Middle Ages. The only exception to this, so far as I know, is the map of the world by Edrisi, of 1154 A. D. This, however, is clearly nothing more than a European map furnished with Arabic legends, superior to the maps by European monks, but inferior to the maps of Ptolemy no less than to the portolanos. The far too great extension east and west, which Ptolemy gives to the Mediterranean, is here reduced, but that sea has received instead a disproportionately great extension to north and south. Edrisi stayed some time in Sicily, at the court of the Norman King, Roger II. His map of the world also bears witness to the fact that he had access to confused accounts of a number of large islands situated in the north, and hitherto unknown to geographers. In the main this map may be considered as a type of the circular paratopical maps of the world of the Middle Ages, from those of Petrus Vesconte or Marino Sanudo of 1321, to those of Andrea Bianco (1436), Walsperger (1448),¹ and Fra Mauro (1459), as well as maps of the kind copied in fig. 2. Moreover it ought specially to be pointed out that no normal portolano formed the foundation of Edrisi's drawing of the Mediterranean and the Black Sea, although, as may easily be proved by measurements, the contrary was the case with the later maps, such as those of Vesconte and Bianco. These are certainly not intended to serve as a guide for sailors; nevertheless I reproduce them here (figg. 6 and 7) because they give us some idea of the maps that, at the beginning of the era of great geographical discovery, suggested to the navigator his dreams of new countries rich in treasure, and foreshadowed to him the ways by which they could be reached.

Naturally we must judge of the cartography of the Arabians on the evidence of the maps that have actually come to our hands, and for my part I do not doubt that the above severe sentence is perfectly justified. There is, however, a passage in Barros' *Asia*,² which seems to indicate, that besides the above-mentioned maps, formed by straight lines and arcs of circles, but not marked in degrees, there were to be found, even among the Arabs, sailing-charts with



5. Map of the world in the Cathedral at Hereford from the 13th century. From Jomard (reduc. $\frac{2}{5}$).

degree-lines, perhaps comparable in their finish to the portolans of the Middle Ages. Barros relates that when Vasco da Gama during his first voyage, in April 1498, arrived at Melinde on the east coast of Africa, he there procured a pilot named Guzarate to sail his ship to India. Da Gama was much pleased with him, especially since the pilot showed him a map made in the Arabian (Moorish) manner of the whole Indian coast, without compass-lines but divided by meridians and parallels into small squares. The pilot also

showed him some nautical instruments intended for determining latitude, different to those which da Gama had brought with him.

Probably a sailing-chart of this kind served as basis for the remarkable drawing of the Indian Ocean which occurs in the Catalan Atlas of 1375. No such maps are now extant, and my attempt to procure, through a merchant of Suez, some map-sheets from the ports of the Red Sea or of the north-west Indian Ocean, has not been crowned by success.

IV.

Portolanos: 1. Their characters, standard of measurement.

As may be gathered from what has already been said, there are no true sea-charts extant from the first thousand years of our era. Nor are any sea-charts or maps intended for navigators mentioned in the literature of that period, excepting those ascribed by Ptolemy to Marinus of Tyre. Probably they have been used up or accidentally destroyed, as have the charts of antiquity, as have many of the "Paskaert", which were printed in the Netherlands during the 16th and 17th centuries, as have the cordage and sails of the ships for whose use they were made. No place in the book-collections of the learned was ever theirs. The same is the case, as every investigator in this field has had to acknowledge with regret, with the sea-chart literature of a far later time, important though it would have been for the history of trade and of geographical discovery. In how many of the large libraries of Europe one seeks in vain for, let us say, the maps of the Mediterranean by BARENT, printed in 1595, or any one of the many editions of WAGHENAER'S *Spiegel der Zeevaerdt* from the end of the 16th century, or DUDLEY'S *Arcano del Mare* from the middle of the 17th. The maps made for the guidance of skippers were as a rule copied for use, not as other manuscripts for preservation, and were thrown away as worthless when they became antiquated and worn out. To avoid misunderstanding it may be further pointed out, that we are discussing sea-charts founded on actual observations of more or less correctness, and maps of the world based on those charts.

A sea-chart, probably a portolano, is mentioned, as D'AVEZAC (*Boll. d. Soc. geogr. ital.* 1874, p. 408) has shown, so early as the account of the crusade of St. Louis, in 1270. In RAYMUND LULL'S *Arbor scientiae*, from the end of the 13th century or the beginning of the 14th, is written (according to the Lyon edition 1515, fol. cxci): "Marinarii quomodo mensurant miliaria in mari? . . . Et ad hoc instrumentum habent, chartam, compassum, acum et stellam maris."¹ We can see from this that charts have been in use at least since the 13th century. But how these charts were constructed we do not know. For at present there is no real sea-chart extant, of which the date can be fixed with certainty, older than Petrus Vesconte's portolano of 1311.²

What is remarkable is that, as regards the drawing of the maps of the Mediterranean and the Black Sea and as regards technique, these works had already assumed the form of the "normal portolano", which is in many respects so highly finished. This was afterwards maintained with little alteration, till, during the 17th century, portolanos were replaced by engraved charts, founded on measurements of the sea or at least on accurate astronomical determinations of place. The normal portolano may with certainty be regarded as the final outcome of the practical experience of centuries of sailors, which at different periods took form and expression in the *Periplus of Scylax*, in the chart of Marinus of Tyre, in the

Stadiasmus, and in numerous sailing-directions not even known by name. Again, the work that immediately preceded the portolanos seems to have consisted of a number of skipper-charts of certain common ways of trade along the coasts. These special charts have subsequently been compiled into a single work. On pl. III are represented some maps which probably are but slightly altered copies of such special charts from the 10th to the 12th centuries. To these I shall return later on.

First, however, I shall give the characters of the best-known portolanos, and an account of the degree of exactitude which they have reached, as well as of the mode of projection and the standard of measurement which were used. I shall then attempt to explain when and where the primitive type was composed, and shall make a tabular comparison of legends etc.

The portolanos or loxodromic charts are almost always drawn on parchment, often on a whole skin of the shape shown in fig. 10; in which case they are generally kept like map-rolls. For greater convenience they are often divided into several smaller leaves, which are glued on to thin boards of wood or card, which were fastened together along one edge, in book-form, into a portolan-atlas. The drawing is generally executed with the utmost care in several colours: black, red, green, blue, yellow, gold, and silver. The colours are used according to certain rules, which have been kept unaltered or exactly copied by a whole series of portolan-drawers. Thus the Red Sea, for instance, is almost always reddish-brown, and on most portolanos Rhodes, even long after the island was conquered by the Turks in 1522, is red with a white cross. Of the names of cities, islands, and ports occurring on the coasts, the majority are rendered in black, a smaller number in red. With only few exceptions, the coast-names written in red are the same on portolanos of Italian as on those of Catalan origin.

The typical portolanos are projectionless maps, on which the draughtsman has tried to the best of his ability to draw the coast of the countries to be mapped, giving the correct distances and the exact mutual relations. Since the original portolan-drawers had evidently no notion of the globular shape of the earth, they had no conception of the difficulties to be overcome in accurately representing in one plane the outlines of vast tracts. As to the possibility, or rather the impossibility, of drawing a map of a large part of the surface of the earth on a plane surface, with correct distances and azimuths for all places indicated on the map, I must refer to my Facsimile-atlas, p. 49. I there point out, that the portolan-draughtsman stumbled on a mathematical impossibility, when he wanted to indicate the places at a correct distance from each other and yet at the same time with their correct azimuths; and that, if attention were paid exclusively to the azimuths, *i. e.* so that the map correctly gave

¹ M. D'AVEZAC: *Coup d'oeil historique sur la projection des cartes de géographie*, Paris 1863, p. 38.

² One of the works of Giovanni da Carignano may be yet some years, the *Carte pisane* some decades, older. Possibly also FORMALEONI (*Essai sur la marine ancienne des vénitiens*, Venice 1788, p. 157) is right in his supposition that the planisphere of Andrea Bianco, published in an atlas of 1436 (N. fig. 7), is a work by a monk of the 13th century. It seems to date from the time when the conception of the shape and extension of the inner sea that obtained during the first thousand years of our era, had begun to be dispelled. The same atlas contains also a Ptolemaic map of the world almost unaltered, and divided into latitudes and climatic regions. This, if the date 1436 may be regarded as covering all the maps of Bianco's atlas, is almost contemporary with the translation into Latin by Jacobus Angelus of the Geography of Ptolemy. In that MS. of DATI from which the maps in pl. III are taken, there appear also Latin maps by Ptolemy on the projection of *Donis*. This MS., too, seems to be about contemporary with the Latin translation by Angelus. It therefore seems to me probable that the maps of Ptolemy were translated into Latin and copied, before the text of the Geography was itself translated.

the orientation of the places in relation to each other, then one gets a map on Mercator's projection. A glance at the boundaries of the Mediterranean and the Black Sea, given on pl. IV, partly according to a modern map on Mercator's projection, partly according to portolanos from the 14th, 15th, and 16th centuries, shows that the projection of these latter corresponds very closely with that of Mercator. But with the slight exactitude required during the centuries just named, the mistakes arising from the globular shape of the earth were not so perceptible in maps of the Black Sea and the Mediterranean, drawn on a plane, especially as the portolanos were not provided with lines of latitude or longitude,¹ by which the inevitable mistakes as to the mutual situation of places would have been more easily revealed. Instead of the

rose is drawn to the west of England, and Pinelli's portolano (1384), where there is a small compass-cross in the middle of each map-sheet.

Loxodromes and compass-roses show the sidereal or true north, and have thus nothing to do with the misleading compass, even though a similar "rose" to that of the portolano was drawn on the card that used to be attached to the sailors' magnetic-needle, which was too restless without ballast, and too difficult to decipher without the compass-card divided according to the points. It might have been thought that another object of the loxodrome net-work was to facilitate the copying of the maps, for which purpose it is admirably adapted if it be carefully laid down before the actual drawing of the map. This however was not the case;



6. Map of the world by PETRUS VESCONTE, 1320. From Konrad Kretschmer (reduc. 2/3).

geographical coordinates now in use, the portolanos are, as may be seen from the many reproductions here given, crossed by loxodromes or "rhumb-lines", i. e. straight lines in the direction of the different winds and proceeding from a number of crossing-points regularly distributed over the map. These points are on portolanos of the 16th century, less frequently on portolanos of the 15th, marked by carefully drawn compass-roses, on which the points of the compass are written at length or denoted by special letters. Such compass-roses do not occur on those portolanos of the 14th century that I have seen in the original or in facsimile, with the exception of the Catalan Atlas (1375), on which one solitary compass-

for the disposition of the crossing-points of the loxodromes in the portolanos, which otherwise conform to such rigid patterns, is altogether arbitrary, and on the maps I have examined the loxodrome- or portolan-network has been laid down after the drawing of the map itself.²

I even doubt whether the loxodrome-network, which is generally quoted as specially characteristic of these maps, belonged to the original normal-portolano, the primæval type, which was copied by Vesconte, Dulcert, Benincasa, Bianco, Voltius, and other drawers of portolanos from 1300 to 1600. For while the colours, the shape of the coasts, the legends, the symbols, standards etc. have been kept unaltered

¹ During the 16th century attempts were made to divide the portolanos in degrees. I shall return further on to the unexpected difficulties, that here met the map-draughtsman.

² THEOBALD FISCHER has delivered an opposite opinion (*Sammlung Mittelalterlicher Welt- und Seekarten*, Venedig, Ferdinand Ongania, 1886, p. 82)

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for centuries, one seldom comes across two portolanos with a similarly drawn loxodrome-network. How slavishly, in other respects, the originals were copied, is to be gathered from the fact, that the style of special maps of the Adriatic and the Archipelago in most portolan-atlases is quite peculiar, and different from the style of the other maps by the same author; for instance, the Adriatic in Piziganos' portolano of 1373 (ONGANIA's reproduction, VI; N. fig. 11),¹ in Giroladis' of 1426 (ONGANIA, VIII), and in Pinelli's portolan-atlas (N. T. XVII) and others. Likewise the accompanying figures (fig. 9) show that the outlines, often quite arbitrary, of smaller islands, capes, and creeks were long maintained unaltered without regard to the real shape.

The contours given on plate IV make it further clear that the drawing of the coast from the mouth of the Mediterranean to the eastmost part of the Black Sea was, in its main lines, very fairly rendered even in the oldest portolanos. The long axis of the Mediterranean, which was not determined by means of a direct voyage between Spain and Syria, but by means of a voyage in and out along the north coast of Africa, was twisted *athwart the sun* 11 to 12 degrees, whereby Constantinople and the Black Sea were placed too far north. This mistake persisted on both maps and charts till JOHN GREAVES (*Phil. Trans.*, vol. XV, 1685, p. 1295) showed, that Constantinople had been placed too far north by 2° ever since the time of Ptolemy. To this it may be added, that the fairly correct shape of the inland seas of the Old World, which was given in the portolanos from the very beginning of the 14th century, was accepted by the learned mapdrawers only after it had been proved by accurate astronomical determinations that the shape which Ptolemy had given to the Mediterranean was entirely incorrect.

All small islands and coast-cliffs, unimportant as regards geography, but important for coasting voyages, are drawn disproportionately large on the portolanos. The same is also the case with projecting points, and with the bays situated between them. Even shallows are marked, and are denoted by the same sign as is still used.

On typical portolanos neither the character of the ground, rivers, mountain-chains, nor cities are marked in the interior of the country, but along the coasts legends occur in all the greater number. Thus there are along the north-coast of the Mediterranean about 620 names, along the coasts of the Sea of Marmora and the Black Sea about 260, along the Mediterranean coast of Asia about 160, along the north coasts of Africa about 240, to all which may be added a multitude of names of islands. Most of these names are, as just mentioned, written in black colour, but some are in red, and the places marked by red are, with only occasional exceptions, invariably the same on all portolanos from the beginning of the 14th to the end of the 16th century. In the first place the more important ports have been honoured with the red distinction, but this has been done in a very arbitrary manner, so at least it appears to us. Often it is not so much the size of a place as its suitability for a port of call, for provisioning, or for taking in water, that seems to have determined the colour by which it has been marked on the portolano. Perhaps, too, the author of the normal-portolano marked with red such ports as were indicated on the special maps which served as the basis of his work.

The portolan-manufacturer or draughtsman used by preference gaudy and bright colours. Often these are wonderfully well preserved. In other cases, ink and colours have been used which during the course of centuries have corroded and destroyed the underlying parchment, and made the legends illegible. In *Nautica mediterranea*, Roma 1601, p. 189, CRESCENTIO begins by giving an account of the cosmographers' mode of making charts with the aid of more or less comprehensive determinations of latitude and longitude. Then he

continues: "Questo è adunque il modo, che si tiene nel fabricare Geograficamente le carte: però, perche elle hoggidi non si fanno saluo da huomini idioti, basta auuertire che egli si fanno rigando con aghi sottili damaschini, le coste poi mettendo questa sceda con aghi sottili damaschini, in che vogliano fare vn'altra pertusata sopra la carta pecorina, in che vogliano fare vn'altra nuoua spoluzeranno sopra con Indico ben macinato, sola questa poluere è atta à fare questo effetto, doppo con penna sottile si tirano le coste sopra lo spoluerizo, oueramente mettendo la sceda sopra vn tellaretto della grandezza della stessa carta, per il quale passino alcune corde di Leuto, ò Citara dall' vno all' altro lato bene attesate à modo di quadretto, che mostra la figura sopra d'Ibernia, & sopra la sceda mettendo la pecorina sopra che si hà da fare la nuoua carta, & immobili l'vna e l'altra incontro alla spera del Sole, restando il modello assai trasparente; si disegneranno con sottilissimo lapis le coste, & doppo si tireranno con inchiostro & penna sottile. Hà da essere la carta di corpo bianca, & niente grassa: doppo si tirano le coste à oro, ò verde, & gli otto Venti principali, cioè Leuante, Ponente, Mezogiorno, Tramontana, Scirocco, Maestro, Greco, Libeccio, di negro; gli altri otto mezani trouati trà questi di colore verde, è meglio la pasta verde che il verderame, essendo che questo rode la carta, & guasta gli altri colori, & vltimamente le 16 quarte sono tirate di rosso, cioè minio & cinaprio stemperati tutti con acqua, & vnpo co di gomma arabica; dell' Isole poi sono fatte ad arbitrio conforme, più campeggiano i colori & appor-tano più vaghezza all' occhio, saluo che per l'ordinario la Sicilia si fa di verde, & Rhodi & Malta di rosso con la Croce bianca in mezzo conforme all' arma della Religione. Perciò essendo stata signoreggiata da Genouesi, gli fanno la Croce rossa col campo bianco conforme all'arma di quella Signoria; scriuonsi vltimamente i nomi de luoghi di negro, ma quei della Città, & alcuni luoghi principali di rosso."

As I have already mentioned, as regards the Mediterranean and Black Sea, also to a certain extent as regards the drawing of the west coast of Europe to the mouth of the Elbe and the north-west coast of Africa, the portolanos became so completely fixed in the pattern, that they afterwards kept to the end of the 16th century, that one must not consider them as separate works but as faithful copies and translations of the same document, which I here, for want of a title and of the author's name, have designated the *normal-portolano*. The normal-portolano only comprised that part of the coasts of Europe, Asia, and Africa that is mapped on such portolanos as that belonging to Tammar Luxoro (N. T. XVIII), that by Petrus Vesconte of 1318 (N. T. VI), the Upsala-portolano (N. T. XIX), and the portolano by Voltius of 1593 (N. T. XXX), all which may be regarded as almost unaltered copies of the original work of the end of the 13th century. It is true that this primæval type was gradually supplied with additions: to begin with as regards the mapping of the Scandinavian peninsula, Iceland, and Greenland, which before the forays of the Normans to the south were undiscovered countries for the sailors of the Mediterranean; then as regards the extension of the coast-map to the interior of the countries, by marking there also the names of nations, cities, mountains, and rivers; subsequently too, by grouping the countries to the south of the equator and beyond the Atlantic around the old frame. But the foundation itself, even on these portolanos, provided with what might be called notes and appendices, remained perfectly unaltered up to the beginning of the 17th century. How completely this is the case, is shown by the above-mentioned outline drawings on plate IV, by the table inserted on p. 20, showing the distances in the Mediterranean and the Black Sea on different portolanos, and finally by the comparison made in the next chapter between the legends of various portolanos of widely separated periods.

¹ FERDINAND ONGANIA has published photographs of 17 portolanos or portolan-atlases, together with a catalogue of them that is added to Fischer's work.

Almost all portolanos are, as is shown by the reproductions here given, supplied with a scale of distance, generally very carelessly drawn up, and placed either at the edge of the map or as a ribbon in the interior of the map-sheet. The ribbon-like scale suggests that the navigator used a tape-measure, not compasses, for reckoning distances on the map. On land-maps of the 16th and 17th centuries on the contrary

The distance-scale of the portolanos is, as Formaleoni has already remarked (*op. cit.*, p. 52), always divided into decimals or rather into fifths. The distance between two lines on the scale divided into fifths was evidently too small to allow of a complete decimal division. One part of the scale, i. e. half the distance between two points of the scale, or one-tenth of the main divisions of the scale, denotes, as



7. Map of the world by ANDREA BIANCO, 1436. From Formaleoni. (Diameter of circle in original 0.25 m.)

compasses are often drawn at the side of the scale, together with an explanation, rather naïve as it now seems, how the compasses ought to be stretched, fitted, and used. It seems to follow from this that compasses were not in use among merchant-captains before the beginning of the 16th century. A pair is, however, drawn in one of the nautical diagrams of Andrea Bianco's atlas of 1436.

the table below shows, the same distance on all the portolanos I have examined. As I shall show later on, this distance does not exactly correspond to any of the other measures used at the close of the Middle Ages, so far as their length is known. To avoid misunderstanding I shall therefore use the name *portolan-mile* (p.m.) for it. Its length may be gathered with tolerable accuracy from the following table.

Distances on portolanos in portolan-miles.

	Date of the portolano.	The length of 1 p.m. on the map.	Gibraltar—Cape Bon.	Gibraltar—Genoa.	Genoa—Venice.	Genoa—Cape Bon.	Cape Bon—Venice.	Venice—Cape Rumi.	Venice—Alexandria.	Cape Bon—Alexandria.	Alexandria—Cape Rumi.	Ras el Khanzir—Cape Rumi.	Ras el Khanzir—Cape of Sinope.	Perekop—Cape of Sinope.	Perekop—Poli.	Poli—Cape of Sinope.	Poli—Ras el Khanzir.	Ras el Khanzir—Cape of Sinope.
Carte pisane 1)	about 1300	1.41 mm.	235	267	74	134	178	237	357	289	177	121	142	—	—	—	—	—
Giovanni da Carignano 2)	about 1300	1.00 "	237	258	59	135	159	243	360	300	192	124	153	92	130	87	143	108
Tammar Luxoro's portolano 3)	14th century	0.56 "	247	266	59	136	161	241	363	301	188	130	145	91	131	78	130	105
Petrus Vesconte 4)	1311	0.91 "	—	—	60	134	161	247	369	300	201	126	152	94	129	81	131	107
Angelino Dulcert 5)	1339	1.08 "	240	258	61	137	160	235	353	293	191	125	144	91	133	88	143	102
Franciscus Pizigano 6)	1367	1.22 "	239	259	52	127	168	237	357	292	185	124	146	90	134	85	130	108
Atlas Catalan 7)	1375	1.02 "	235	262	56	127	153	228	349	290	189	124	144	89	124	83	134	109
Pinelli's portolano 8)	1384	1.02 "	237	250	56	127	152	238	347	279	173	119	137	92	127	83	131	114
Catalan planisphere, Florence 9)	15th century	0.96 "	233	243	62	128	161	231	347	290	186	122	154	89	130	86	135	102
The Upsala-portolano 10)	15th century	1.22 "	239	252	61	137	161	246	361	305	193	131	153	93	130	84	142	115
Nicolaus de Combitis' portolano 11)	15th century	0.95 "	246	263	60	134	167	246	373	299	190	131	150	96	133	91	140	101
Jacobus Giroldis 12)	1426	0.94 "	244	260	62	136	158	—	374	—	196	—	—	90	128	86	142	104
Andrea Bianco 13)	1436	0.45 "	230	256	61	126	150	244	348	290	192	122	144	92	118	82	140	104
Spool-shaped planisphere, Florence 14)	1447	0.29 "	230	252	61	129	153	230	336	277	194	140	145	91	125	85	133	107
Anon. portolano in the Nordenskiöld collection 15)	about 1500	0.92 "	239	249	61	137	163	247	363	302	193	127	149	95	130	82	139	109
The Dijon-portolano 16)	about 1550	1.12 "	228	243	61	128	153	237	348	296	185	123	146	91	125	78	136	111
Matheus Prunes 17)	1560	0.91 "	238	257	57	132	158	250	367	304	191	136	149	90	133	77	146	114
Domingo Oliver 18)	1568	0.98 "	229	241	57	131	152	234	349	287	186	127	144	87	122	77	136	108
Vincentius Voltius 19)	1593	0.90 "	238	252	62	138	162	246	374	300	188	132	150	88	—	—	110	142
Average	—	—	237	255	60	133	160	240	358	293	189	127	147	91	128	83	137	108
Real distances in minutes 20)	—	—	79'	81'	161'	450'	505'	770'	1181'	935'	603'	404'	429'	270'	358'	250'	417'	293'
The length of the portolan-mile in minutes	—	—	3'.34	3'.21	[2'.68] ²¹	3'.38	3'.16	[3'.21] ²¹	3'.30	3'.19	3'.19	3'.18	[2'.92] ²¹	2'.97	2'.80	3'.01	3'.04	2'.71
																	[3'.08] ²¹	[3'.04] ²¹

1) According to JOMARD's reproduction here given on a smaller scale, fig. 10. The map is drawn on a whole skin. Small, carelessly drawn scales are placed in a circle on the neck of the skin, where later portolanos have the Virgin Mary and Child-Christ, as well as in another circle in the middle of the upper part of the map. The Black Sea is blotted out. The Carte pisane seems to be one of the oldest portolanos preserved.

2) According to measurements on the photograph by ONGANIA (II). The measurements are uncertain, partly because of the imperfection of the distance-scale, partly because several of the triangle-points, used for these measurements are hidden by drawings, somewhat like the supposed nail-heads on the map of the world discovered by Stefano Borgia. In reckoning the distance, I have taken 0.4 mm. of the scale on the photograph to correspond to one p.m. Since the photograph, when compared with Uzielli-Amat's statement as to the size of the original (0.92 × 0.62), appears to be reduced to 4/10, this means that one p.m. = 1 mm. in the original. (N. T. V.)

3) According to the reproduction in DESIMONI's and BELGRANO's excellent monograph on this portolan-atlas (vide infra p. 25). It is divided into eight plates, of which pls. I—IV, VI, and VII are drawn on about the same scale (half the distance between two points in the scale = 0.56 to 0.575 mm.); plate V, the chart of the Adriatic, is drawn on a somewhat larger scale (1 p.m. = 0.85 mm.); plate VIII, the chart of the Black Sea, on a somewhat smaller scale (1 p.m. = 0.46 mm.). When I give distances between places situated on different plates, the measurement has been made after the plates have been reduced to a common scale and joined together. (N. T. XVIII.)

4) According to ONGANIA's photograph (II). Only the east part of this, the oldest dated portolano, is preserved. In spite of its great age, it is a complete normal-portolano, differing little for instance from the portolano of Voltius, 1593. (N. T. V.)

5) According to measurements on a photograph communicated by the owner of this important map, Mr. LESOUËF. (N. T. VIII, IX.)

6) According to measurements on the reproduction by JOMARD.

7) According to measurements on the reproduction by BUCHON and TASTU. (N. T. XI—XIV.)

8) According to measurements on SANTAREM's beautiful reproduction. (N. T. XV—XVII.) The portolano belonged first to the Pinelli family and afterwards to Baron Walkenaer. The normal-portolano here measured is drawn in four sheets, on the same scale and evidently belonging together, wherefore the date 1384 occurring on one of these sheets refers to all four maps. In the same portolan-atlas there also occur three other map-sheets, perhaps of a later period; two of these consist of special maps of the Adriatic and the Archipelago drawn in the broad, coarse, round style peculiar to such special maps.

9) According to ONGANIA's photograph (XIII). Two carelessly drawn scales are denoted on the map. They do not correspond completely, probably because of the shrinking of the parchment. The portolan-mile = 0.96 mm. (on Ongania's photograph 0.72).

10) Typical normal-portolano, belonging to the library of Upsala, probably of the beginning of the 15th century. (N. T. XIX.) It is drawn on a parallelepipedal skin without the projection to the west that often occurs. The portolano is wrinkled by damp but fairly well preserved.

11) According to ONGANIA's reproduction (VII). I doubt whether the map is of the 14th century; rather of the first part of the 15th. P.m. on Ongania's photograph = 0.735 mm., which corresponds to 0.95 on the original.

12) According to ONGANIA's reproduction (VIII). The length of the portolan-mile in mm. is calculated with the aid of Uzielli-Amat's statement as to the size of the original.

13) According to measurements on ONGANIA's (MAX MÜNSTER's) photographs (IX) of a collection of maps by Andrea Bianco, dated 1436 and kept in Marciana. Bianco has published many kinds of maps and used several different distance-scales on his maps. On the map measured by me, comprising all the area of the normal-portolano, the portolan-mile = 0.45 mm. On some of the photographs the distance-scale was cut away when they were mounted on card-board. (N. T. XX, XXI.)

14) Measurements made on ONGANIA's reproduction (X). Some of them are uncertain, among other reasons because it was hard to decide exactly where the measurements should commence at Genoa, Venice and Alexandria, which are denoted by great castles. On the east side of the map there are two scales, divided as usual into portolan-miles, with the inscriptions: "Pro C milliaribus" and "Pro L milliaribus". The latter refers to a distance-scale in 26 divisions, each corresponding to 10 p.m. the former to a distance-scale of the same length, divided in 13 parts, each including 20 p.m.

15) Probably of the first half of the 16th century. It is hurt by the tooth of time but was evidently constructed with great care on a whole skin. (N. T. XXIII.)

16) According to measurements on GAFFAREL's photographic reproduction in *Étude sur un portulan inédit de la bibliothèque de Dijon* (s. a.). Gaffarel supposes the portolano to be of the 15th century. The compass-roses show that it was made during the 16th century, probably about 1550. As usual the map is a slightly modified copy of an older original.

17) Kept in Badia di Cava. According to a very incomplete reproduction on a scale reduced to one half by GIUSEPPE DE LUCA: *Carte nautiche del medio evo designate in Italia*, Napoli 1866. W. Ruge has examined this portolano more closely and found that it is signed *Matheus Prunes in civitate Maioricarum anno 1560* (the last figure uncertain). The scale is carelessly laid down on two parts of the map. (Compare W. RUGE: *Zur Geschichte der Kartographie*, in J. I. KETTLER's *Zeitschrift für wissenschaftliche Kartographie*, VIII, Weimar 1891.)

18) Original in my collection, gaudily and coarsely drawn on a whole skin. (N. T. XXIX.)

19) Original in my collection. Three maps executed with the greatest care, folded in the middle and bound into a portolan-atlas. The legends will be quoted *in extenso* later on. (N. T. XXX.)

20) Or *nautical miles*. I use minutes here only as a topographical measure of length regardless of its relation to the circumference of the earth. To pay any attention to the mediæval conception of the size of the globe or the length of the degree of latitude, when trying to put in order the metrology of the Middle Ages, is only to introduce another element of confusion into a question already very involved and difficult to solve.

21) The numbers enclosed in square brackets are *distances by land*, and therefore are not to be compared with the other distances measured during sea voyages. The most notable deviation is to be found in the line Genoa-Venice, which is too large in proportion on all maps.

The measurements are executed according to the scale that is marked on almost every map, often in duplicate, and always divided in the same manner. In measuring from prominent points (*e.g.*, Gibraltar, Alexandria, the cape to the west of Sinope) or embayed harbours (*e.g.*, Genoa and Venice), I have measured from the basis of the promontory, or the mouth of the harbour, since such projections or embayments of the coast are always drawn too large on the portolanos. Generally it is impossible to identify with perfect exactitude the points from which the distances have been calculated on a modern map, with the corresponding points on the portolanos, and this of course produces considerable errors in the comparison.

The measurements at all events show: 1 that, as regards the outline of the Mediterranean and the Black Sea,

drome-net. While the latter is always drawn very carefully and cleanly with the aid of a ruler and compasses, the scale is often a bad free-hand drawing. Such it is, for instance, in the *Carte pisane*, in the portolanos by Petrus Vesconte of 1311 and 1318, by Pizigano of 1373, in the *Upsala-portolano* and Combitis' portolano of the 15th century, in Matheus Prunes, 1560, and in Augustinus Russinus, 1590(?). The scale is drawn with greater care in Dulcert, 1339, in *Atlante mediceo*, 1351, in the Arabic portolano in Ambrosiana, in Andrea Bianco, 1436 and 1448, Domingo Olives, 1568, Vol-tius, 1593, and in Crescentio, 1596.

At first I thought that the obvious faults and defects of the portolan-scales depended on the shrinkage which the parchment had undergone during the course of centuries. That this is not the case, however, is shown by the loxo-



8. Map of the world from *Atlante Mediceo*, 1351, western part. (Orig. size 0.425 x 0.36 m.)

all the portolanos are almost unaltered copies of the same original; 2 that the same scale of distance was used on all the portolanos. Here it is to be remarked, that the scale itself, even on portolanos that are masterpieces of execution in other respects, often is so carelessly drawn that there is a notable difference between the length of its different parts, a clear proof that the portolan-drawers were not cosmographers but unlearned handicraftsmen with a fair share of artistic talent. As regards technique, there is in most cases a queer contrast between the scale of distance and the loxo-

A. E. N. II.

dromic lines, which are generally very sharply ruled. Although they stretch over the whole length of the map, they are still almost as straight as when they were drawn. On some badly treated portolanos, however, there occur, especially near the edges of the map, evident traces of uneven shrinkage; but that the defects of the scale do not depend on this, is proved by the fact that a scale that is crooked and awry is often framed by lines that are straight and parallel.

Notwithstanding these defects, the distances of the Mediterranean and the Black Sea, when measured by the scale

belonging to each map, only show minor deviations undoubtedly arising from the mistakes of the copyist. A proof of this is afforded by an extract from the table given on page 20, which is printed here for reader comparison.

The length of the portolan-mile.

	True distance.	Number of p.m. varies between.	Average distance in p.m.	The length of a p.m.
Gibraltar—Cape Bon	792'	228—247	237	3'.34
Gibraltar—Genoa	819'	241—267	255	3'.21
Genoa—Cape Bon	450'	126—138	133	3'.38
Cape Bon—Venice	505'	150—178	160	3'.16
Venice—Alexandria	1 181'	336—374	358	3'.50
Cape Bon—Alexandria	935'	277—305	293	3'.19
Alexandria—Cape Rumili	603'	173—201	189	3'.19
Alexandria—Ras el Khanzir	404'	119—140	127	3'.18
Cape Rumili—the point of Sinope	270'	87—96	91	2'.97
Cape Rumili—Perecop	358'	118—134	128	2'.80
Perecop—the point of Sinope	250'	77—91	83	3'.01
Perecop—Poti	417'	130—146	137	3'.04
Poti—the point of Sinope	293'	101—115	108	2'.71
Average	—	—	—	3'.11

If the average length of the portolan-mile be calculated by dividing the sum of the numbers in the first column by the sum of the numbers in the third, a value of 3'.17 is obtained. The difference depends on the fact that in the former case every measured distance has the same weight in determining the probable value of the portolan-mile, while in the latter case the measurements have a weight in proportion to the distance measured. It is difficult to tell which number ought to be preferred. On the one hand it is probable that the shorter distances were easier to estimate than the longer ones, since in the latter a steady wind was less likely to hold throughout the voyage; on the other hand the tendency of the portolan-draughtsmen to exaggerate prominent points and indented creeks has had a worse effect on the settling of the length of the portolan-mile in the former case than in the latter. I shall therefore adopt here an approximate mean, *viz.*, one portolan-mile = 3'.15 (= 5.83 kilometres). This number gives half the distance between two points of the scale on all portolanos I have examined. It forms the unit of length used on the normal-portolano, which was so often and so slavishly copied.

This, however, agrees neither with the information concerning the length-unit of the scale, as given in the legend to the distance-scale on those few portolanos of Italian make that bear such an inscription, nor with the length in miles that results from the statements of distance in old sailing-directions for the Mediterranean.

In the portolano of the priest Giovanni da Carignano of the beginning of the 14th century, preserved in the State Archives of Florence, is written above the scale: "Nota quod quodlibet spacium denotat miliaria decem, maius spacium denotat miliaria quinquaginta et hec mensura . . . per mare licet non in omnibus per terram propter vias tortuosas."² Here the map-draughtsman informs us that the distance between two points of the scale includes ten milliarum; thus one milliarum ought to equal 0.2 p.m. = 0'.63 or 1.16 kilometres, and, as the appendix shows, he is evidently aware that this milliarum does not correspond to a milliarum by land.

In the elliptical (or rather, spool-shaped) portolano of 1447, preserved in the National Library at Florence, it is also stated that divisions of the scale, including ten to twenty

portolan-miles, correspond to fifty and one hundred milliarum. Here too, each milliarum is supposed to equal 0.2 p.m. = 0'.63 or 1.16 kilometres. The legend to the scale on a portolano of Vesconte de Maiolo, of 1512, also agrees with this: "Saparay como da uno ponte a l'arto sono miglia cinquanta" (UZZIELLI-AMAT, *op. cit.*, II, p. 107).

To the distance-scale of the Arabian portolano preserved in Ambrosiana, is affixed a legend, which, according to TH. FISCHER (*op. cit.*, p. 221), means: *This the miles, every house 100*. By measuring on the map, it can easily be shown that this scale is an ordinary portolan-scale. Since each "house" (double division) of this scale consists of twenty portolan-miles, the mile of the Arabian map-draughtsman must have equalled 0.2 p.m. = 1.16 kilometres.

As guides for navigation within the limits of the normal-portolano, there existed, as is well known, manuscript sailing-directions, some of which were published in print during the 15th and 16th centuries. These sailing-directions contain, like the Stadiasmus, an enumeration and short description of ports, directions and advice how these ought to be put into, as well as statements of the distances between a great number of them. The following calculation of the length of the nautical mile is made with the aid of such a sailing-direction, which, under the title *Opera nova chiamata portolano laqual narra tutte le terre & porti de leuante cominciando a Venetia . . . , novamente stampata per PAULO DANZA sul ponte de riuoalto*, was printed in Venice at the beginning of the 16th century. Herein I have only paid attention to the longer distances over stretches where coasting was impossible. In this work the miles are denoted by the name "Mia."

The length of a nautical mile.

	Mia.	True distance.	The length of a mio.
From the isle of Gozo near Crete to the isle of Gozo near Malta	750	484'	0'.64
" " " " " " " " Majorca	1 600	1 029'	0'.64
" " " " " " " " Cavo Gavata in Cyprus	650	429'	0'.66
" " " " " " " " Alexandria	500	354'	0'.71
" Cavo Gavata in Cyprus to Alexandria	400	255'	0'.64
" Cavo St. Andrea in Cyprus to Damiat	450	287'	0'.64

On an average then the nautical mile used in this work seems to be the same as 0'.65 or 1 204 metres.

In the chart of the Atlantic, which is reproduced in pl. XXVII, there is at the top a double scale of distance. If this be compared with the distances in that part of the Mediterranean included in the map, it appears that the numbers given in the lower part of the scale (c, cc, ccc, cccc), correspond to the lengths according to the distance-scale of the normal-portolano, on the assumption that the unit equals half the distance between two points. This length-unit was consequently that used by the cartographer, although when reckoned according to the *incorrect* degrees of latitude of the map it equals 3'.6, not 3'.16 *i. e.* not the number that follows from the above-quoted measures of distances in the Mediterranean and the Black Sea, but a number that would make the Mediterranean as drawn in the portolanos too large by one seventh. In the upper part of the scale each of the compartments that are alternately blank and shaded, but not divided into smaller parts, probably represents 100 milliarum. In that case 100 p.m. = 400 milliarum, and each milliarum = 1 457 metres, a number that deviates little from

¹ In this table I have left out the distances over land: Genoa—Venice, Venice—Cape Rumili, Ras el Khanzir—Cape Rumili, Poti—Ras el Khanzir, and Ras el Khanzir—the point of Sinope.
² G. UZZIELLI e P. AMAT DI S. FILIPPO: *Studi biografici e bibliografici sulla storia della geografia in Italia*, II: *Mappamondi, carte nautiche, portolani ed altri monumenti cartografici specialmente italiani dei secoli XIII—XVII*, Roma 1882, p. 49.

the length of the Roman and early Italian mile, which is 1 479 metres.¹

In an elaborate portolano by Johannes Martines of Messina, 1567, marked with degrees of latitude, and partly reproduced by SANTAREM, a degree of latitude = 12.5 p.m., or 1 p.m. = 4'.8. The circumference of the globe, therefore, is here taken as too small by a third.

From what has been said it seems to follow:

1) that the original normal-portolano used a length-measure of 3'.15 or 5 830 metres; it is this length-measure that I have named *portolan-mile*;

2) that the scale of distance depending on this measure of length was kept unaltered in all portolanos up to the 17th century;

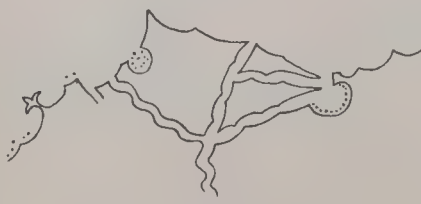
proportion of 1 miglio = 0.25 p.m. or 1 457 metres was assumed;

5) that when, in the 16th century, the portolanos were ruled in degrees, the portolan-scale was kept unaltered; but the degree of latitude had assigned to it a completely erroneous value in portolan-miles, depending on an incorrect estimate of the size of the globe. As a rule the earth has been considered smaller than it really is, and this is also shown by the much-discussed correspondence between Columbus and Toscanelli, and has not been without influence upon the history of discovery of the New World.

In enquiring into the origin of the normal-portolano, it is important to find out where the length-unit of its scale of distance was in common use at the time when it came into



1. Petrus Vesconte 1311.



5. Petrus Vesconte 1311.



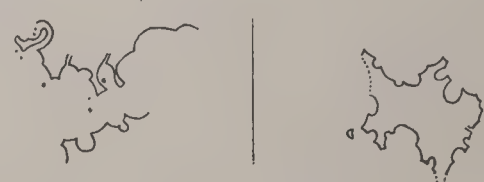
9. Petrus Vesconte 1318.



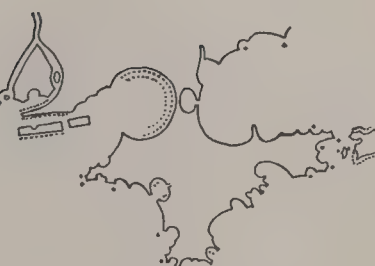
2. Anon. 1351.



6. Anon. 1351.



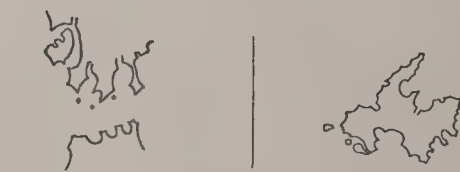
10. Anon. 1351.



3. Anon. 15th century.



7. Anon. 15th century.



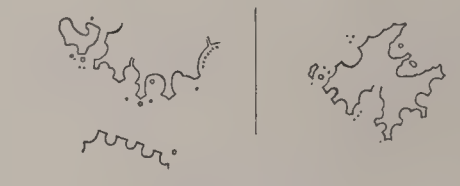
11. Anon. 15th century.



4. Bartol. Crescentio 1596.



8. Bartol. Crescentio 1596.



12. Bartol. Crescentio 1596.

9. Crimea (1-4), the point by Alexandria with the mouth of the Nile (5-8), the Strait of Gibraltar and Majorca (9-12), in portolanos of 1311-1596.

3) that the Italian portolan-manufacturers and portolan-draughtsmen did not know this length-unit, but that they sometimes tried to fit the Italian mile-measure with the portolan-scale, by assuming that the distance between two points of the scale corresponded to 10 miglia; whence one miglio got the utterly erroneous value of 0.2 p.m. or 1 166 metres;

4) that at times also when the portolan-scale was adapted to the Italian mile-measurement, the nearly correct

existence. Our knowledge of the mile-measure of the Middle Ages is extremely defective and the whole problem difficult to solve, among other reasons because, just as the *stadium* formerly had different values in different countries, so the length of the *mile* varied. Often also, it changed in the course of time. An idea of the confusion that arose through this may be gathered from the meritorious attempt of RICCIOLI to bring order into the muddle (*op.cit.*, lib. II, *Stadiasmus*), and from the writings of numerous later workers in the same field.

¹ The length of a milliarium is variously given from 1 477 to 1 481 metres. In *Geographiae et hydrographiae reformatae libri duodecim*, Venetiis 1672, p. 33, RICCIOLI draws a Roman *semipes*. Its length is calculated from the dimensions of a bronze measuring-vessel of the time of Vespasian. The *semipes* here = 0.150 metres, which corresponds to a length of 1 500 metres for the milliarium. But in spite of Riccioli's prudence in printing the figure that gives the length of the half-foot separately, after the paper was dry, this has, during the 223 years that have passed since Riccioli's work was published, in my copy been stretched about 1.4 per cent., probably in consequence of pressure when the book was bound.

The portolan-mile seems to have come nearest to the Spanish "legua", which in the middle of the 16th century was stated by PIETRO DA MEDINA to equal $60'/17.5 = 3'.43$ (*Arte del navegar*, Venetia 1609, fol. 48 v).¹ A smaller legua, however, also seems to have been used in Medina's time, as shown by these words: "Si computano per ogni grado leghe XVII e mezo, & non piu." In folio 51 Medina says further: "Eight stadia make one mile; three miles, or according to others four miles, one legua; seventeen and a half legua, one degree." It seems as though the length of the legua changed considerably before its value was fixed by the determination of the relation between the legua and the degree of latitude. Here it should be observed that the knowledge of the length of a degree of latitude was itself so uncertain down to the 17th century, that its employment to decide the length-measures of the Middle Ages only increases the confusion. In his work *De ponderibus et mensuris*, edit. [Frankfort] 1611, the celebrated Spanish historian IOANNES MARIANA states that 8 stadia = 1 milliarium, = 5 000 Roman feet (p. 105); that 1 leuca = 3 milliaria, 5 stadia, 25 feet, in other words = 3.63 milliaria (p. 158). One leuca (or legua) thus equals 5.37 kilometres, = 2'.90. But in other places, according to Mariana, one legua or leuca is considered to contain 19 800 Toledo-feet; one Toledo-foot again corresponds to $52/53$ Roman foot. One leuca would in such a case equal 3.88 milliaria, = 5.74 kilometres, = 3'.10, i. e. almost of the same length as the portolan-mile.

I therefore consider it most probable that the Spanish, or rather the Catalan, legua was the length-measure for the normal-portolano, and subsequently copied, down to the 17th century, in Italy and other countries round the Mediterranean, evidently without knowledge of the meaning of the scale. The old portolan-scale still occurs on a portolano signed *Iouan Battista Cauallini in Livorno anno 1642*.

It should be noticed that if 10 "marine" stadia be considered as equal to 1', a relation which seems to follow from the statements of distance in Scylax and in the *Stadiasmus*, and further if it be supposed with HERODOTUS (II: 6) that 60 stadia go to the Egyptian (Phoenician?) length-measure *schoinos* (*σχοῖνος*), then one *schoinos* becomes, as near as may be, the same as the distance between two points of the portolan-scale, i. e. 2 p.m. It is therefore possible that the measure used in the portolanos had its ultimate origin in the time when the Phoenicians or Carthaginians ruled over the navigation of the western Mediterranean, or at least from the time of Marinus of Tyre. To follow UZIELLI-AMAT (*op. cit.*, II, p. 17) in identifying the length-measure of the portolanos with a Roman milliarium conflicts with the measurements I have carried out.

In the table inserted on p. 20, the 2nd column of numbers gives in millimetres half the length of the interval between two points of the distance-scales. If this number be divided by the length of the portolan-mile in millimetres, i. e. by 5 830 000, one gets the scale of the map. This, as shown by the following table, varies, although in such a manner that the portolanos can be divided into certain groups ac-

cording to their scales, and that portolanos of widely different periods seem to be drawn on about the same scale.

The map-scale of the portolanos.

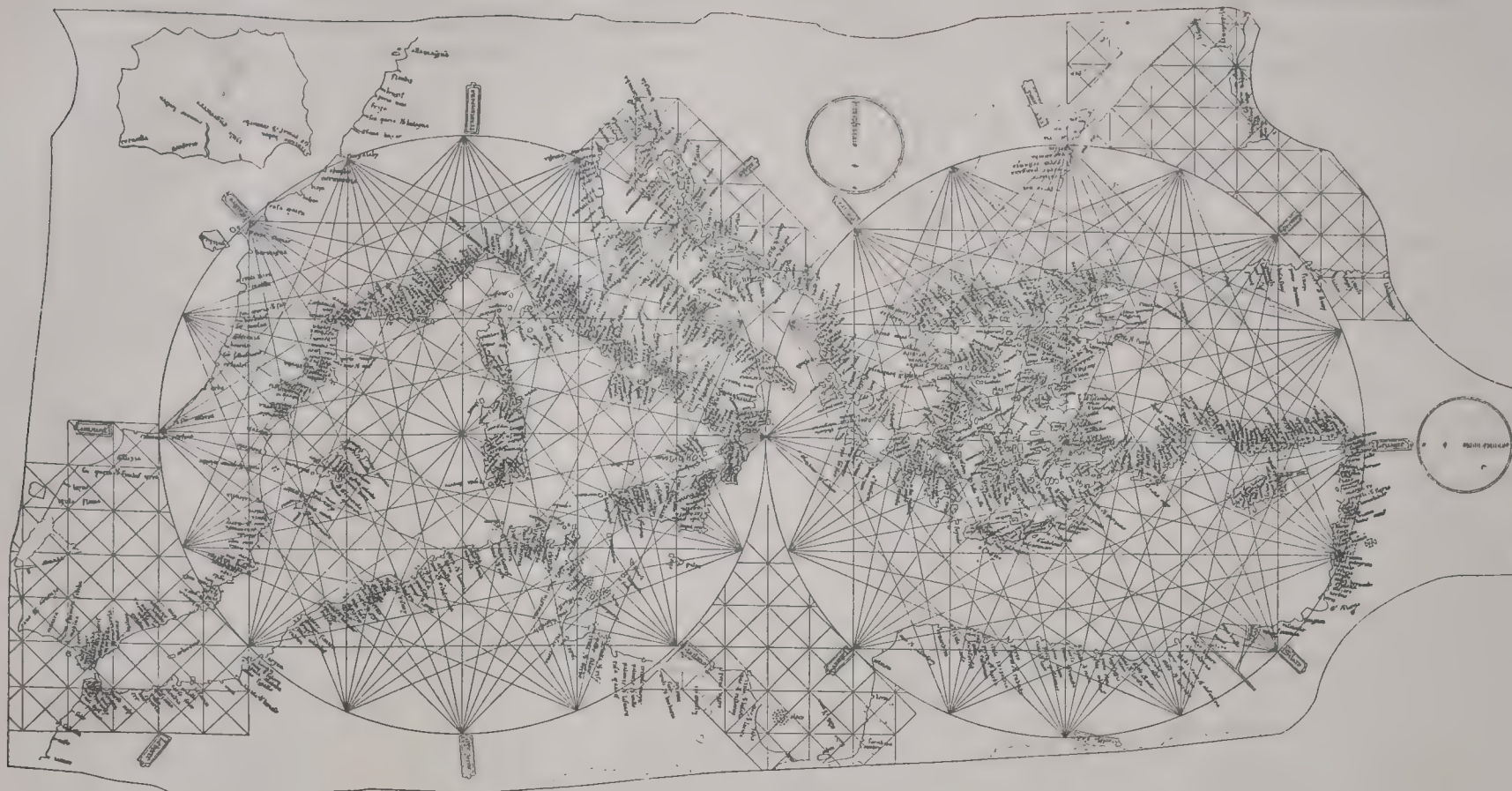
	The length on the map of one p.m. in mm.	Approximate scale.
Map-sheet, containing <i>the inner sea</i> , by Andrea Bianco, 1436 ²	0.45	1 : 13 000 000
Tammar Luxoro's portolano, 14th century (some of the maps)	0.56	1 : 10 500 000
Voltius, 1593	0.90	1 : 6 500 000
Petrus Vesconte, 1311	0.91	
Matheus Prunes, 1560	0.91	
Anonymous portolano in the Nordenskiöld collection, about 1500	0.92	
Giroldis, 1426	0.94	1 : 6 000 000
The Lucerne-portolano, 16th century ³	0.94	
Nicolaus de Combitis' portolano, 15th century	0.95	
Catalan planisphere, 15th century	0.96	
Andrea Bianco, 1436 ²	0.96	
Domingo Olives, 1568	0.98	
Augustinus Russinus, 1590(?)	0.98	
Bartol. Crescentio, 1596 ⁴	0.98	
Giovanni da Carignano, about 1300	1.00	1 : 5 750 000
Atlas Catalan, 1375	1.02	
Pinelli's portolano, 1384	1.02	
Dulcert, 1339	1.08	1 : 5 500 000
The Dijon-portolano, about 1550	1.12	
The Upsala-portolano, 15th century	1.22	1 : 5 000 000.

Thus, then, in the portolanos measured by me, the scale varies from 1 : 5 000 000 to 1 : 13 000 000. On portolan-planispheres the scale is still smaller, e. g. on the spool-shaped planisphere preserved in the National Library at Florence, 1 : 20 000 000. Most portolanos are drawn on a scale of 1 : 6 000 000. This, however, is only the case with such maps as include the Mediterranean and the Black Sea. The portolan-draughtsmen also made special charts on a scale much larger than that of the general chart. Thus in Pizigano's charts of the Adriatic and of the Archipelago (N. figg. 11 and 12) the scale is 1 : 3 700 000; in the chart of the Archipelago by Augustinus Russinus 1 : 1 500 000.

I have previously drawn attention to the fact that the wind-rose lines which cross the portolanos in all directions have remained almost perfectly straight even on quite old and badly treated portolanos. And yet there is no doubt that the parchment on which the maps are drawn, has, subsequently to the drawing, undergone considerable shrinking, perhaps equally great in all directions of the plane. This has probably varied with the different kinds of parchment. Bearing this in mind, it seems likely that all the maps from Voltius to Pinelli, enumerated in the above table, were originally drawn on the same scale, or according to a pattern that retained its size unaltered except for the modifications which were necessarily entailed by the repeated transference of the pattern (by the pouncing method that Crescentio describes) from an old dried parchment to a new skin not quite dry.

A further contribution towards explaining the connection that exists between the portolanos of different periods, is given by a comparison of the coast-legends. This is done in the next chapter.

¹ I have not had access to the original Spanish edition, printed in Cordova, 1545.
² Andrea Bianco's atlas of 1436 contains maps on several different scales. Unfortunately the photographs to which I have had access are so foolishly trimmed, that it often is impossible to determine on what scale the originals are drawn.
³ According to a reproduction by SANTAREM. This magnificent work probably dates from the middle of the 16th century, not from the 14th or 15th.
⁴ Hand-drawn normal-portolano in my collection; it seems to be the original of the printed chart in CRESCENTIO'S *Nautica mediterranea*.



10. "Carte pisane," about 1300. From Jomard. (Orig. size 1.045 x 0.502 m.)

V.

Portolanos: 2. Comparison between the Legends.

Anon. 14th cent. ¹	Atlas Catalan 1375. ²	Girolidis 1426. ³	Voltius 1593. ⁴	Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.
1. Gibraltar to Marseilles.				lena darmeria	lena del meria	lena darmeria	lena dalmaria
monte zuibeltar	mont gibeltar	zubeltar	M: gibiltera	ARMERIA	ALMERIA	ALMERIA	ALMARIA
tore de uacar	tore de uacar	tore de bacar	tore deuares	gata	cap de capia	boara	c: degata
stopona	stopona	stopona	stopona	rait	santo	gata	s: piero
marbella	marbela	marbela				rait	p: ienouesi
fenoiarolla	fenyarola	fenoiarola	fenoiarola	menxa	mensa	messa	
molins	molins	molinj	c: de molini	carbonerola	carbonayrola	carbonarolla	
MALICA	MALICIA	MALLICIA	MALICA	bera	BERA	bera	BERA
c. de malica		c. de mallica	c: manduca	magor	margo	magor	morgo
malia de bis	maliabelis	mallia de bis		aquille	aguilles	aquille	aquiles
ponta de tore	punta de tor	ponta de tore	p: de torre	coppo	cop	copo	eop
	mauro	mauro	maura			magor	masaro
negreli	negrels	negrellis	negrolis	suanas	susaya	suanas	susani
milleca	muleca	meleca	muletta	carminzar	carmenya	carminçar	
SARAUIGNA	SERAUIGNA	SARAUIGNA	SELOBIRNIA	CARTAIENIA	CARTAGENIA	CARTAIENEA	CARTAGENOUA
tarfocacos	tarfocases	tarfocacos	tarfocases	magno		p. magno	
comin	comin	comim	comi		cap de pals	c. di pallj	c: depali
captor	captor	captor		bufera	albufera	bufera	albufera
bugniol	bagnor	bugnol		c. ceruer	caruer	c. ceruer	
	tadra	tadra					matta
guardiana	guauardiqueya	guardia		guardamar	guardmar	guardamar	
arcambra	lena dal can[bra]	arconbra			fluuius segu		

¹ "The portolano of Tammar Luxoro" from the beginning of the 14th century. The original in Genoa. The legends are copied from: *Atlante idrografico del medio evo, posseduto dal prof. Tammar Luxoro, pubblicato a fac-simile ed annotato dai socii C. DESIMONI e L. T. BELGRANO, Atti della società ligure di storia patria*, V, Genova 1867.

² The original in the Bibl. nationale of Paris. From the admirable photographic reproduction in: *Choix de documents géographiques, conservés à la Bibliothèque nationale*, Paris 1883, compared with the memoir of BUCHON and TASTU in *Notices et extraits des manuscrits de la Bibliothèque du roi*, XIV, 2:e partie, Paris 1841.

³ According to the photograph by F. ONGANIA (VIII). The proof corrected by comparison with the original in Venice.

⁴ According to the original in my collection.

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
lampo LACANTERA arcorda otilla	cap de lal . . ALLACANT cap darcodra otilla	c. de iup LA CANTARA arcorda otilla	c: deiupo ALI CANTI c: dalcodia bendormi
la campana aqua carpi	calp cap de marti	la campana muraire carpi 2. c. de martin ¹	c: martino
sabie	DENIA	1. DENIA ²	DENIA oliua gandia culera albufera
gandia cugliera	gandia cugera	gandia cuiera	
cauo VALENZA	VALENÇIA ↗	VALENÇA	VALENZA
grado monuedro boriana auropeya	montuedre boriana aurpessa corp	grado monte uedro boriana auro pexa	grauo moruedra buriana c: urpesa corp
paniscola	peniscula	paniscola	paniscola fnas
grado de tra FORTONA	grad de tortossa tortossa	grado TOLLOXA	FARTOSA
p. fangoxo ampola balinger rodellastre	port fangos anpola beleger ruiduyastre	p. fangoxo anpola palaner rodollestre	p. fangoso anpola ballaguer
SALLO FARAGOGNA	sallo FERRAGONA	SALLO FARAGONA	torman p: salo p: fangoso anpola ballaguer
camarit sises lombregat BAZALONA	tamarit sises lombregat BARCELLONA ↗	camarit sises lombregat BARZELLONA	torman p: salo p: fangoso anpola ballaguer
sanpolo blanes torxa san felic pexamar aquafreda mede AMPURIE	sanpol blanes tosa san felio palamos cap daygua freda medes roses	sco pollo blanes tosa s. fellio pesamar c. daguafreda mede ANP . .	torman p: salo p: fangoso anpola ballaguer
anxam poruerens colluuro salxe	lanza portuenre COLLIURA salses	lançam poruerens COLLIURO salses	c: de Creus codaque
leocatta NARBONA sanper serignam agde cauo de septa monde de zera magallona stagnom	leocata nerbona ↗ sanper serigna agde cap de seta magalona	leocata NARB sco pera sarignan acde monde de gera magalona	canet c: leocata NARBONA s: piero sunia ade M: seuta
AQUEMORTI VIGNOM ARLES odor bocolli bonim collone	monpesler aygues mortes VINYO ARLES odor boc collone	MONPOLLIER AQUE MORTI VIGNOM ARLES odor bocollij bonim collone	lates monpiller aquemorti bocari c: colanni

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
2. <i>Marseilles to Naples.</i>			
MARSELA	MASELA ↗	MARSSEIA	MARSEGLIA
pormm aquille	pormm aguilles(?)	pormim aquille	ciuseta
bendormi sanaxar	bendormi san nazar	bendormi sco naçar	ciutat
LOLOM carabaxera	IELOM calabazaira	LOLION carabaseria	c: secaci LOLOM
ERENS	ERES	ERENS	trincabalili
bonar	bo . . . aron(?)	bonar	berganson c: benat
fraxneo	fraxneo	fraxneo	
FRAGUR	FREZUR	FRAZUR	S. URPE FRIGIU
agau	agam	agau	c: russo
santa margarita gallopa	sca margallita gallopa	sca margarita galopa	cana
NIZA	var nisa	uar NIZA	c: lagorupa
olliuj MONAGO	oriuori monago	olliuj MUNEGO	NIZA uilla franca MONACO
xx milia sepe	ve[n]imilla ↗ seue	XX MIA sepe	monton uinti miglia
porto morixe ² meledandolla ALBENGANA	portomoris mere dandora ALBENGANA	p. moris ARBENGA	p: maresi c: demille ARBENGA
finar uarioti NOLLI	finar uarioti NORI	fanar(?) uariigoti NOLI	FINA
uai SAUONA	vay SAONA ↗	uai SAUONA	nori
uarenzam ARENANAM	uarazem arenza	uaragem ARONSAN	SAUONA
uotori	uotori	uotori	larazi utri sestri
pegi	pegi co de far	pegi	
ZENOVA codemonte	LANCA ↗ nerui	ZENOVA co de monte	GENOVA
p. dolim rapallo	port darfi rapalo lauania	dolim rapallo	p: fino rapallo
SESTRI leuanto ² P. UENERI spezie c. coruo magra	sestri leuanto PORTO UENER G. de speza coruo magra	SESTRI leuanto PORTO UENER la spezia c. corbo la magra	chiauari leuanso p: ueneri SPETIE coruo magra
MOTRON	motron	MOTRON	massa monton uiaregio cercio
sergi PISA	sergi PISA ↗		PISA
p. pixano	port pissam	p. pissam	
uada p. barato PIONBINO	mont nigro vayda balatero plunbi	uadi p. barato PIONBINO	LIUORNO M: negro p: barato PIONBINO

¹ The number before the name indicates the order of the names on the map.

² On the original the two parts of this name are separated, so that *morixe* is placed before *xx milia*.

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.	Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
farexe c. de troia	farexe cauo de troya	farexe c. de troia	c: latroia castiglioni	bibona	bibonas	bibona	lopizo biuona c: zabru TROPIA c. baticani
pescera	pescayra groxeo	pescera groxeo	2. groseto 1. talamon	torpia baticam nicotera bagnara	turpia batica nicotina ioya	torpia batican nicotra baiara	gioia palma siglio
talamon san stefano	talamon san steuan argentina portercori	tallamon scō stefano	M: argentaro p: erculi lansadouia M: alto corneto	uolpe catona regio pelari arme	coa de uolp catuna rezo pelori	. oli uolpe REZO pelari(?) arme(?)	c: darne
p. ercori	montalto corneto	monte alto corneto	ostia	spartiuento borsam	spartiuent bo...m GIRAZO	c. spartiuento borsam	c: spartiuento
ciuita ueia cauo de linara scā souera ROMA	CIUETA UEYA cauo delinar santa sauera ROMA hostia	ciuita ueia c. de linar scā souera ROMA	c: linaro s: seuero ROMA	stilo SCHILAZI castele colone COTROM lena roxan	SCHILAZO castelle cauo de colonie COTROM leza rossa...	stillo SCHILAZI castelle collone COTROM lena rossam ^x	c: colonni COTRONI c: lalici ROSANO torigliano treboder rose...
splazia romana chao danza lastura	cauo danza stora	splazia romana c. dança lastura	c: danza natoni M: cercelli teracina GAETA mola garigliano M: dracon	besan roxeri policor tore de mar g. de taranto TARANTO cecaria galipolli oxenti	besace roset pelicot tor de mar TARANTO gallipolli orgenti cap de les leuques	trebessage roxeri policor tore de mar g. de taranto TARANTO cesaria galipoli oxenti	c: darne c: spartiuento TARANTO GALIPOLI c: s: maria
c. sorcelli FERACINA GAETA molle garilano mondragon	cerce... ter...ina GAYTA molla grilan mondragon castro amar baya	c. de sorcellj TERAZINA GAETA mola garilano mondrago castel lamar baia	nisari	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
baia	niseri	nisari	nisita	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
nixari	niseri	nisari	nisita	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
3. Naples to Venice.				g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
NAPOLLI g. de napolli	NAPOLS	NAPOLLI	NAPOLI	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
KASTELAMAR	castro amar sorenti	CASTELLAMAR	castelamare	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
minerua	minerba	c. minerba	ligalli	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
malfi SALERNO g. de salerno	marfi SALERNO Golfo de salerno	malfi SALLERNO g. de sallerno	silli	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
k. abati	cano delicossa	c. delicoxa ulastra	aropoli c: licosa	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
c. de licoxa ulastra	palanuda fores...	palo nuo forestra	lazarolo pisota palanudo	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
palinuo foresta	palanuda fores...	palo nuo forestra	laoliua PULICASTRO sapri	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
panicastra safri malatri tim san nicolo	POLICASTRO sapri scō nicolao	policastro safri malatra 2. dim 1. scō nicolo	dino	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
SCALLIA	scalea(?) cerelle(?)	SCALLEA	toredarco SCALIA cirella diamante	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti
belueder citraro santo niceto mantea suaro SCA FOMIA	belue... citrar scō noxet mantea cauo suaro scā femia	belueder citraro scō noceto la mantia la suaro S. FOMIA	citraro MANTIA c: suaro s: fomia	g. de taranto TARANTO cecaria galipolli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti	g. de taranto TARANTO cesaria galipoli oxenti

^x This and some of the following names in the 3rd col. are copied from the chart of the Adriatic by GIROLDIS, which is richer in legends and somewhat different from the general chart. But the names on this special chart, those not occurring on the portolano of Tammar Luxoro, the Atlas Catalan or the portolano by VOLTIVS are here omitted.

^y This and some of the following names in the 4th col. are copied from the chart of the Adriatic by VOLTIVS.

Anon. 14th cent.	Atlas Catalan 1375.	Girolldis 1426.	Voltius 1593.
fortor campo marin termole tregnio guasto petagata luce sanguano	campo termine	fortor campo marin termolle tregno guasto petagata luce sanguano	fotor campo marino termini guasto penabux s: uito ortona francauilla piscara comano praia de rizan Iulia noua s: andrea s: fabiano f: tronto legroti pedaseno torre de palma fermo CITA NOUA recanati
ORTONA francauilla PESCERA saline ponta de ciram	...ncauilla PESCAYRA comano atri scō andrea scō fabiano trunto le grote fermo ciuita noua potencia	ORTONA franca uilla PESCERA 2. saline 1. ponta de ciram SAN FABIAN tronto le grote pedaxeno tore de palma FERMO san tomazio CIUITA NUOVA MONTE SANTO RECANATI	francauilla PISCARA comano praia de rizan Iulia noua s: andrea s: fabiano f: tronto legroti pedaseno torre de palma FERMO CITA NOUA recanati
san flabiam tronio grote boca blanco pedaxeno tore da parma fermo san tomazio CIUITA NUOVA MONTE SANTO RECANATI	san flabiam tronio grote boca blanco pedaxeno tore da parma fermo san tomazio CIUITA NUOVA MONTE SANTO RECANATI	san flabiam tronio grote boca blanco pedaxeno tore da parma fermo san tomazio CIUITA NUOVA MONTE SANTO RECANATI	san flabiam tronio grote boca blanco pedaxeno tore da parma fermo san tomazio CIUITA NUOVA MONTE SANTO RECANATI
lo monte ANCONA flumexino SENEGATA FAN PENARO la catolica	lo monte ANCONA flumexino SENEGATA FAN PENARO la catolica	lo monte ANCONA flumexim SENEGATA FAN PENARO la catolica	lo monte ANCONA flumexino SENEGATA FAN PENARO la catolica
RIMANO luxo cexenadego CERUIA sauio santa maria RAUENA primero magnauaca caualine uolane golane goreo loredo foxom brondollo CLOCIA poueta malamoco	RIMANO luxo cexenadego CERUIA sauio santa maria RAUENA primero magnauaca caualine uolane golane goreo loredo foxom brondollo CLOCIA poueta malamoco	RIMANO luxo cexenadego CERUIA sauio santa maria RAUENA primero magnauaca caualine uolane golane goreo loredo foxom brondollo CLOCIA poueta malamoco	RIMANO luxo cexenadego CERUIA sauio santa maria RAUENA primero magnauaca caualine uolane golane goreo loredo foxom brondollo CLOCIA poueta malamoco

4. Venice to Cape Matapan.

VENETIA	VENECIA	VENETIA	VENETIA
muram maciorbo lido iexolo pigneda lienza santa margarita CAUORLE baxelege taiamento	muram mazorlo exolo cauorle beselege taiamento	muram maciorbo lido iexolo la pigneda la lienza santa margarita CAUORLE baxellege taiamento	muram maciorbo lido iexolo la pigneda la lienza santa margarita CAUORLE baxellege taiamento

Anon. 14th cent.	Atlas Catalan 1375.	Girolldis 1426.	Voltius 1593.
lugnam GRADO AQUILEA belforte monfalcon TRIESTE g. de trieste MUGLA ISTRIA IXOLA PIRAM UMAGO CITTANOVA gileto PARENCO orxara ROIGNO	grado AQUILLEA belforte monfalcon TRIESTE Golf de triest istria canpo de polla pola prementor FUMI bocari bocarici setrinize san iacomo NOUE GRADI molini cano dessero SEGNA san zozzo Golfo de quarnar NONA drugoia JAVRA iayra ueya larta SCARDONA lo ciramixo SIBINICO muraie cauo cesta porto caualier figo TRAU SPALATO DALMISSA la fara clayna Golfo de narent NARENT comano santa ziuliana porto prati stagnio malfe colamota ombla grauoxia RAGUXI molini raguxi uechio malonto san marco CATARO trasto buda aqua	lugnam GRADO AQUILLEA belforte mon falcon TRIESTE G. de triest MUGLA ISTRIA ISOLLA PIRAM UMAGO CITA NUOVA quieto PARENCO ROIGNO PUOLA polmontore FLUME BOCHARI bocharigi setrinige san iacomo NOUE GRADI molliny SEGNA san corçi colfo de quarnar micalona CIARA CIARA uechia larta SCARDONA ciramixo SIBINICO muraie cauo cesta porto caualier figo TRAU SPALATO DALMISSA la fara scō corçi colfo de narenta cauo chumano zuliana porto prati stagnio malfe callafota onbla grauossa RAGUXI mollini raguxi uechio malonto scō marco CATARO trasto budoa aqua	grauo AQUILEA M: falcon triesti muia ISTRIA isola pirano umago cita noua guieto parenso osera ROIGNO POLA promonture FIUMI bucari bucariza SEGNO s: giorgi nona craina ZARA zara uechia SCARDONA SIBINICO c: cesia p: caualier c: figo TRAU spalatro almissa craina s: giorgi G: de narenti NARENTI c: cumano giugliana prapatno stagnio slano malfa onbla grauosa RAUSA rausa uechia molunta castel nouo CATARO budua

Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.	Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.
INTIUARI	antiuer	INTIUARI	ANTIUIARI		Golfo de larta	sco nicola	
ualdenoxie	ualle de noxe	ual de noxie	ual de noci			colfo de larta	G: de larta
DOLCIGNIO	DULCHIENO	DOLZIGNO	2. DOLCIGNO	LARTTA	LAKIA	LAKTA	LARTA
lodrim	lodrim	LODRIM	1. londrino	figallo	cauo figalo	c. figalo	c: figo
medoua	porto de medua	la medoa	s: io: de medua	aspico	assille	asipo	
lexla		ALLESSIO	ALESSO				dracomestre
santa nastaxia		sca nastaxia		pescere		pescere	pestaira
p. palli		p. de pallj		natollico	natillico	natolico	matolica
			c: ridoni		streto de corinto		
DURAZO	DURAZO	DURAZO	DURAZO	LEPANTO	nepanto		
cauo de laquj	cauo de laqui	c. de laquj	c: de lachi	asprospiti	lepanto	LEPANTO	LEPANTO
			almagnia	LASUOLLA		asprospiti	asprospiti
lurco		lourco		SOLLA		LASUOLLA	SELLO
leualli		le uallj		lagia		lagia	
	cauo de mer..			mellione		mellione	
			la placa	ostia		ostria	
spinarica	la pimarza	la spinarica	espinarza	lagostica		lagustica	



11. Chart of the Adriatic in the atlas by FRANCISCUS PIZIGANO, 1373. (Orig. size 0.25 x 0.25 m.)

cauionj		cauaionj	camichi	PATRAS	2. PATRAS	PATRAS	PETRASO
UALONA	laialona	UALONA	LAUALONA	trapano		trapano	
raguzio	lorigo	porto raguxio		saline	1. saline	saline	
lengua	la lingua	la lingua	c: lingua	CLARENZA	CLARENZA	CLARENZA	
orxo		ualle de lorxo	ual di lorso				CASTEL TURNESI
aqua		aqua	aquoa	belueder	beluer	belueder	belueder
sofia				fume carbon	G. de carbuus	fim cabor	
palormo	palormi	palormo	palormo	golfo darcadia			G: darcadia
santi xl		sci quaranta	s: 40				NAUARINO
butintro	protanto	butintro	botindro	conclo	p. de jonchs	zonclo	p: iunco
	G. de protanto			MODON	MODOM	MODOM	MADO
uerdepo		uerdepo		griox		griox	
lista		lista			cauo gallo		c: gallo
gouenica		gouenica	gominizi	COROM	CORONI	COROM	CARO
ciuita	ciuita	ciuita	ciuita	colonixj		calonixj	
fanaro					ceuario		
uelliqij	loguiliqij	uelliqij	longoliqui	calamata		calamata	
		sca lena		louitolo		louitollo	

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
crostus maina	penaro crost... mayna	crostus maina	
5. Cape Matapan to the Danube.			
matapan quaie zampanj vatia	matapa gualles pascania	matapa le quaie ranpani uatia	c: matapan
anciollo MALUASIA	..... MALUAXIA	s. ancolo MALUAXIA	c: malia
sanpolo bota		s. polo bote	p: botti MOREA
pezeris		pezeris	
golfo de napolj astro NAPOLLI c. scilli damala fanar preduia sutica	stella G. de napoli astro NEAPOLI cauo(?) schilli ...ada pedr... sutica cemilia CORANTO c. lion COLONE salline	G. de napolj atro NAPOLLI c. scilli damala fanar predena sutica CORANTO lion c. de le colone	c. napoli NAPOLI c. filli ped... nera sutica SENES(?) ATENE
magina maratona santana torela san marco		magina maratona s. ana torela s. marco	
longanico c. blanco talandi ratixa lalenj BONDENICA	longanizo cauo janco talandi ratixa bondeniza LODENA	longanico c. blanco talandi 2. ratissa 1. laleni BONDENIZA	LENA
songito gardica focile	guardica feteleo santo nicolao	longito gardica feteleo	guardia
porto darmiro LARMIRO		p. de armiro LARMIRO	s: nicola G: larmiro LARMIRO UOLO
demitriada san giorçi	dimitriata	demitrida scõ giorçi c. mitrida	c: s: giorgi
monester cauo uerliqij platamo pontaquirit lombardat	monster cauo uerliqui plantamo quitorit	monester c. de uernici pidanemo ponta quirit lombardat	monasteri c: uadiqui plantamor p: quir
uolanda SALONICHI	volada granea SALONICH	uollanda lonigo	G. DE SALONICHI uolanda granea SALONICHI
lembulo colone c. ciocri	punta de lenbulo punta de fanar san zorzo		p: lembullo p: finar s: giorgi
canisto	punta de sabium anistro rariado(?) quifo(?)	2. zapi 1. casandra	casandra
faxo aio mama mo[n]le sancto stelar mandinea la comitexa la carcalla	mont scõ stelar Golfo de la contexa carcala	arcasson monte santo stellar mandinea la contessa carcalla	p: coffo M: SANTO G. de comitara randino LASTRAMOLA
lastimola grixopoli leteropoli cristopoli langistro	lastromola grisopoli LOCREROPOLLI cristopoli [languisto]	lastimolla grixopoli leteropoli cristopoli langistro caroxa	grisopoli LASTROPOLI tristopoli langisto cau... c: dasprosa. ASPROSA
ASPEROXA	[ASPEROSA]	ASPROSSA	p: finar MAMARA c: marissa
maragnia	[marona] [mariza]	marognia G. de mariça	ENE paxi cesaria
ponta deno ENO	[ENE] [paxi] [cesari]	zessari zanci G. de cardia GALIPOLLI	G: de cardi GALIPOLI
cançi g. de cardia GALIPOLLI	GALLIPOLLI lauidoa san zorzo polisco gani	s. giorçi panisto longam	s: giorgi polisco gani
sanzorzi polistro longam anido RODESTO solonb	royosdo(?) RECREA solunbria natura rezo CONSTANTINO- POLLI	RODESTO RECLEA solouna	RODESTO
PERA	PERA fillea malatra omidie STRIGETI gatopoli ueroico axine GIXOPOLLI scafida saxilla [lasilo] polo MESENBER lemano lanica	CONSTANTINO- POLI PERA fillea malatra omidie STAGNARA gatopoli uerdico axine gixopoli scafida laxilla 2. poro 1. MESSEMBER lemano lanica viza	CONSTANTINO- POLI pollia STACHNA gastopoli uerdisso sisopoli MISENBRIA c: de lemano
gallata	gallata	galata	mauro
UARNA cetrici	VARNA cetrici	UARNA cetrici	rossia UARNA castuci TAIASTO
gauarna caliacra laxulutico pangala costanza zanaua... groxeo	gauarna caliacri lassilu... pangala costanza zanaua... grossea	gauarna calliacra laxillutico pangalla costança cinauarda groxeo	losiluzo pangalai costanza zara...ld grosea flu

* In some places where the legends on the Atlas Catalan are effaced, I give, within [], the names from the Catalan portolano of 1339, by DULCET.

Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.	Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.
pallastra	palastra lacachi	pallastra	[palastra] [p: dellocaio] [papacogao]	platena	platena	platena	plantena
papacomj roxo	papacomo rosso	2. papacomo 1. roxo nixarj		giro uiopolli	giro viopolli scō vigeni	giro uiopolij	s: uigeni lartos tripoli zefano gira petrino sirisonda s: uasili.
CABARDI pio pixan magromixi	CABARDI porto pissam magre missi TANA	CABARDI p. pixam magromissi LATANA	[bogoman] 5. [cassal de Russi] 1. [ALVIDO] 3. [p: pisano] 2. [mengromisi] 4. [LA TANA] [tocari] [basmacchi] [trimagina]	laitos TRIPOLLI zefalo giraprino CHIRISONDA	laytos tripolli zeffanol giraprino CHIRIZONDA san uaxilli omidie bazar schifi	lairros TRIPOLLI zeffallo giraprino CHIRISSONA scō uaxillj omidoe baçar schifi	uesar cecceni s: tomas LEONA p: man
zacharia hexencim	iacaria lacinachi	çacaria bessenci.		la uona pormon UATIZA	lauona pormon VATHIZA	lauona pormon UATIÇA	amo lamiro liminia lirus SIMISO
lotal	lotar	lo . al	[trapano] [peso] [s: giorgio]	omnio larmino limonia lurio SIMIXO	honio lamiro liminia lurio SIMISO	onio larmino limonia lurio SIMISSO	liminia lirus SIMISO
PEXO sanziorsi locicopa locici COPA c. croxie MATREGA mapa	pesso san zorzo locicopa locichi COPA cauo de croxe matrega mapa	pesso scō çorci locicopa locici COPA c. croxe MATREGA mapa	[comisto] [c: di croce]	plategona laguxi lalli panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli caramj	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
trinixe m:io lacho	trinisie mauro lacho	trimisse mauro laco	mapa s: fimen MAURI LUCO c: cara	DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
m:ia zaquia pio zorzuquj albazaquia ZAQUIA cuba gusto aiaco cacari	mauro zechia porto de susache alba zechia cuba costo layazo cacari scā sofia	mauro çaquia p. çorquui alba çaquia ÇAQUIA cuba gusto aiaco cacari	p: saco albasequia farmia c: cubai gotto teiasso te carci s: sofia G: giro pesonda	DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
giro pezonda cio buxio fiñ nicofia SAUASTOPOLLI	giro pezonda cauo de bux fiñ nicola AUASTOPOLLI	griro(?) peçonda c. buxo fiñ nicofia SAUASTOPOLLI	f: nicola p: minguello	DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
cicaba gotto tamansa	cicaba goto tamasa	cicaba goto tamoxa	gotto temassa	DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
7. The eastern coast of the Black Sea to Smyrna.				DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
corobendi negapomo lipotemo LOFAXIO	corebendia negapotimo lipotimo fasso	cotebendia negapomo lipotimo fasso arcussi	carbendia [lipocima] [sassa]	DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
san ziorçi lonna	paliosto . . [s. zorze]	scō çorçi lona scō nicola	[policrasto]	DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
gonea	[gonea] archaui	gonea	[gonea]	DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
c. uxa sentina laxia rixo	quissa sentina risso	quissa sentina laxia rixo	quisa sentina	DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
stilli sormena medan	stillo susmena	stilli sormena maidam	risso c: de crosa(?) estillo sarmena fronda	DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]
FRABEXONDA	FRAPESONDA	FRABEXONDA	FRABEXONDA	DOCASTELLI cromena tripixilli SAMASTRO laquia partelli thio pixello mauera PONTERAQUIA limo	plategona languissi lali panigerio galipo carossa SINOPOLLI erminio stefanio quinolli ginopolli carami gira petrino CASTELLE	plategona lagussi lallj panigerio callimo caroxa SINOPOLLI erminio feti stefanio quinolli ginopolli licarami [CASTELLAS]	plategona longasi lalli panigre galipo carossa SINOPOLLI cimo lofetti s: steuan [quiloni] [ginopi] [carcani] [giropotimo] [CASTELLAS]

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
lupai	lupay	luparj	[liballi]
[pa]lorm[i]	marmora	marmora	MARMARA
architasi	palbrini	palormo	[polmia]
g. despi[ga]	lartazi	lardaqui	
....	G. de spiga		c: spinga
	SPIGA (?)	SPIGA	SPINGA
paradixo	larco	arco	
		para	parissa
	apsico	festo	
auco	aspico	CUSSI	
pasequia	AUEO	ENE0	
	passechia	pasequia	

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
grixia	criso	grixona	
FOIA	foya	FOIA	FOGLIE
foia uechia	foya uyea	foia ueia	foglie uechie
8. Smyrna to Alexandria.			
LES MIRI	LES MIRE	LES MIRE	SIMIRI
	lauro	loro	lauro
stelar	stela . .	stelar	stellar
	cauo . . nco	c. bianco	
	soxero		



13. Chart of the Black Sea by MARINO SANUDO (or PETRUS VESCONTE), about 1320. From Konrad Kretschmer. (Orig. size 0.30 x 0.22 m.?)

dardanello	dardanelo	dardanelo	c: deianizari	colica	lacolici	lacolica
erminio	erminio	erminio		beluede[r]	bel ueder	belueder
remixa	romiso	remisso	remisse	ALTO LUOGO	ALTO LUOGO	ALTO LUOGO
labena	lena	lalenì		figella	figela	sigella
santi xl	sci xl	sci xl	s: 40	demoniaire	demoniayre	ANTUERPIA
santa maria	cauo scā maria	scā maria	c: s: maria	p. coxino	cosino	deuonaro
	mortani	mortari		PALATIA		p. coxino
LANDRA[MITI]	LANDERMITI	LANDERMITI	LANDRIMITI	gippo	gipo	PALLATIA
santa ana	scā annanea	scā ananca	gananca	MELAXO	lacso	gipo
san giorçi	san zorzo	scō giorçi	s: giorgi	canal	dardanelo	melaxo
	loguluini			agnel		caual
stinga	stingam	stinga	stinigani		agele	tatodarel
lalea	G. de lalea	lalea	s: enstudi		lesteri	agneli
						COSMEN
						star

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
	Golfo de liereti .. stadia		
crio nicolo	crio nicola	crio nicola	
MEXI	messi	MEXI G. orefexi	MESSI
sanpollo			
p. malfitan	marfitan	p. malfetan	
stataa		stataa	c: non c: sesto
ancolitan	anconitan	ancolitan	
traquia	traquia		raquia
fisco	fisco	fisco	p: sesto
la roxa	larossa	laroxa	layosa
lagiua	lauia	laguia	lani
prepla	prepia	prepia	prepie
	metireme		
g. de macre	Golf de macri	G. de macre	G. de macri
MACRE	MACRI	MACRE	MACRI
sete caui	VII caui	VII ci	7 caui
lapatera		patera	patera
kastelo ruzio	castel rog	castello ruço	CASTEL RUZO
corenti		corenti	
cacauo	cacauo	cacauo	cacamo
stamiro	astamirle	stamiro	
			geranda
finica	finica	finica	finica
	sillidoni		c: celidonia
p:io zepoueze		p. zenoxe	p: ienouesi p: uenetiano
			arustia
zirpast	aratia	aratia	quir pastor
agiopendi	quirpastor	quir past	nio pendi
	agio pendi	agio pendj	G: de setalia
			SETALIA
SATALIA	SATALLA	SATALLA	
satalia uechia	satalea ueya	satillia ueia	setalia uechia
san grigori	san grigor	sco çorçi	
san nicollo	san nicolao	sco nicollo	s: nicola
CANDELORO	CANDELOR	CANDELORO	SCANDELOR
kastel lombardo	castel lombardo	castel lombardo	castel lombardo
ANTIOCETA	ANTIOCETA	ANTIOZETA	ANTIOCA
calandro	calandro	callandro	calandro
stallimure	astallimure	stallimure	stillimur
sequino	sechia	sequino	
			dracanto
			G: de boria
olino	insula de olliue	ollius(?)	
spurie	spurie	spurie	
			gironde
crionaro	crionaro	crionaro	
palopolli	palopolli	palopoli	p: popoli
papadora	papadolla	papadola	p: padola
p. caualier	porto caualier	p. caualier	p: caualer
scoio prouenzal	lo proensal	scoio prouenzal	esculpensa
p. pim	.....	p. pim	
labugaxia	.....	lena dela bagassa	lingua de bagaxxa
zanido	.....	zanico	
CURCO	CURCO	CURCO	CURCO
	lanuzo		lamiso
p. bombilico	bonbolizo	p. bonbillico	banbolizo
lamo	lamo	lamo	lame
torxo	tarso	TERSSO	TERASO
adena	adena	adena	adena
mallo	mallo	mallo	mallo
malmistro	malmistra	malmistra	malmistra
p. palli	port de pals	p. di pallj	2. p: palo
LAIJAZA	layazo	LAIJAZA	3. LOIAZO
mo[n]te gaibo	mont gaybo	monte gaibo	1. M: gaibo
g. de caramilla	Golf de caramella	G. de caramela	G: garmella
			paiaaso
alexandreta	alexandreta	alexandreta	alisandreta
bonel		bonel	
raxacamzir		rassagamir	c: canzir

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
SOLDINO	SOLAM(?)	SOLDINO	SOLDIN
			M: gibel
p. ualo	porto uallo	p. uallo	p: ualo
pasera		passera	
pocim	pocin		
fexero		faxere	
glorieta	gloriata	glorieta	
			gible
LALICIA	lalitxa	LA LIZA	LALIZA
santalexio		sco allexio	
	beona		
		zibelle	
zibelle			
ualinea	valinea		
morgato	margato	morgato	
maracrea	maracrea	maracrea	
TORTOXA	TORTOSSA	TORTOXA	TARTOSA
prixon	prexom		prosen
	larcha		
g. de tripolli		G. de tripollij	
TRIPOLLI	tripolli de suria	TRIPOLLI	TRIPOLI DE SURIA
nafim	nafim	sañm	
pozio contestabel	conestabilli	poço	c: pogio
		oribe	
bordom	bodron		
ZIBELETO	gibellet	ZIBELLETO	gibeletto
fim cano	fim canis	fim can	
BARUTO	BARUT	BARUTI	BARUTTI
damor	damor	damor	camor
ZAITO	saytos	SAITO	saitos
sarafendi	sarafent	sarafendj	
SURO	SUR	SURO	SUR
cauo blanco	cauo jancho	c. bianco	c: bianco
ACRE	ACRE	ACRE	ACRE
			caifasso
carmelo	carmem	carmene	
			carnia
kastel pelegrim	castel pelegrin	castel pellegrin	castel pelegrino
zexaria	CESSARIA	çessaria	
arzuffo	arzuffo	arcuffo	arzuffo
ZIAFFO	JAFFA	ZAFFO	ZAFFO
kastel beroardo	beroardo	castel beroardo	castel bel uardo
scanolla	ESCHALON	scanolla	SCALONA
gazara	gatzara	gaçara	GILSATU
botrom	darom	botrom	deroni
berto	berto	berto	berto
g. de rixa	Golfo de larissa	G. de rixa	G: larissa
	LARISSA		LARISSA
			c: gallo
stagnom	stagnom	stagnom	stagno
racalcasero	ras al casero	racalcasero	casargareso
faramida	faramia	faramida	feramia
	tenes	tenexe	tenes
DAMIATA	DAMIAT	DAMIATA	DAMIATA
flume de damiata	flum damiat(?)		
CAIRO	CHAYRE	EL CHAIRO	CAIRO
BABILONIA	BABILLONIA	BABILONIA	
c. de le brule	cauo bruli(?)		bruli
sturiom(?)	sturi(?)		
	FOF		
flume roxeto	flum ra...t	fim rosseto	ROSETTO
bichieri	casar bocher	bechierj	casar becheri
			c: becheri
san marco		sco marco	
9. Alexandria to Tunis.			
ALESANDRIA	ALEXANDRIA	ALLEXANDRIA	ALISANDRIA
monesteraquj		monestaraqui	p: uechio
tore de iarbi	tore de larabo	tore di arabj	torre darabo
g. de iarbi	Golf de larabo	G. di arabj	G: darabo
caroberio	caro berio	c: carober	c: carobero
rippe albe	ripe albe	ripe albe	ripe albi

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
g. de raxori rabia rasamixar y. de galata lagosegio laguxi p: albertom y. di colombi carbo cassales sallome ponta de rameda porto salom porto mosolomar cauo de luco LUCO porto trabuco y: a patriarca scoi de barda saline raxalltim fauara forcel y: a de carxe BONANDREA marxamua doera lanea rassaucem iogifarie sadra TOLOMETA taocara bergebem BERNICO tuones millel carcora sarabiom camera ZUIRANA ozelli labara p: o sallia y: a cedra 2. g. de tine 1. licodia sibeca satra sortta g. de zedico lame colbine amet mixurata laxueca blata p: o magro lebida p: o rassamixar tissuca rassaxara tissura	Golf raos rayba porto de larassa insula de caleta(?) lagosegio lagussi port alberton illa de colomi carto 2. casales 1. sallones punta de rameda porto salom porto mosolomar punta de luch LUCH porto de celli insule de carsse BONANDREA marzasuse doera lananea cap de rasaosem jungi farie zadra TOLOMETA taocara berzezem BEYNICH teiones millel carcora carcorela sarabium canbra ZUNARA illa de ocel salines bayda punta de sablo sidra Golf de tim lichodia 2. sibecha 1. cauo de sorta casar sayton Golfo de zedico cap de lalart colbene casaramet meserata lassueca brata porto magro lebida porto rassamusem tesuta rasaxara teiura	G. de raxorj raiba rassa missar gallata lago segio laguxi p. alberton y: a de collonbi carto cassalles sallome ponta de rameda porto sallom p. sollomar LUCO p. trabuco y: a patria scoi debarda salline ras salltim fauara forçel y: a de carsse BONANDREA marsamua doera lanea ras uzem logifare satra FALLOMETA toncara bergebem BERNICO teiones millel carcora leoneelj sibeha satra sorta G. de qedico larach colbine amet MISSERATA lassueca blata p. magro lebida p. rassamissar tissuca rassa sara tissura	c: bianco G: deraos raijba p: deraia lagosegio lagussi p: albetran y de colunbi cartoi 2. casales 1. salonefi p: rameda p: solimano p: mansolamar p: luco LUCO p: trabuco bumba uantzella p: patriarca salini c: rasautim fanuara f..... y de caselli BONANDRIA c: bonandria marsasuche doera lanea c: rasaotim longitaria zadra FALOMETA tocura berseceni BERNICH teiones millel carcora carcorella sarabion canbra ZOARA y de ocelli salini stagno baida p: de sabia sidra G: de tim licodia NAÏM 2. xibeca 1. c: de sorta casar sailon G: de zendico ZENDICO c. lamp corbene casar maomet mazarata c: lasuca brata p: magra lebida p: rasamisal tesuta rasara teiura

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
TRIPOLI DE BAR- LEPIS kio sensor tripolli ueio k. ullo lazoara RAXAMABEXI palmeris portelli callarideris zerbi marota capes stanxe k. romol faxoli FAQUEXE k. pignatar capullia AFFRICA coniere monester SUXA requila maometa quipia c. bon nubia g. de tunis	FRIPOL DE BARBA- RIA casar censor tripolli uey casar vilo punta darzoyara RASALMARE palmes portet scala deris illa de gerba muroto casar nacar CAPIS casar romol illes de frixols SFACHIS casar pignatar capulia AFFRICA conieras monestir SUSSA rechilia maometa quipia cabon nubia Golf de tunis	TRIPOLLI cassaro sensor tripollj ueio cassaro ullo la çonara RASSABABES palmeris porteti callageris gerbi moram cassaro nacar CAPES G. de capes 2. cassaro romol 1. y: a de frixollj SFAQUIS cassaro pignatar capullia AFRICA coniere monester SUXA requilea nometa quipia c. bom nubia G. de tonis	TRIPOLI DE BAR- BARIA casar sensor tripoli uechio casatullo p: soiara RASAMABRI palmeus p: teni y degerbi marotto casar nocar CAPIS casar demal y de frisoli FACHS casar pignatar capullia AFRICA coniglieras monasteri resilia G: de maometta MAOMETTA calibia c: bono nubia

10. Tunis to Cape Spartel.

TUNIS	TUNIS	TONIS	TUNISI
rasalgiber	guardia RESERT guardia de bixerti doseror raxamisar tamacratl TABARCA tremotes marzacariss cauo de ruoxa foca de bona BONA uxdena	guardia doe solor ras alminxar tamacratl TABARCHA tre moles marçagarj c. de ruoxa foca de bona BONA us de na	c: cartagina p: farina guardia BISERTA guardia uechia dascolor c: rasamisal tamacratl TABARCA mazia caresi c: derosa G: de bona BONA p: genouesi c: bono p: tre cruce c: de ferro G: de stora STORA talinesi ALCOLLO c: bugiarmi GIGER y de caualli balafia gient mensoria c: bugia BUGIA y de pisani c: carbo
enticioxi petra de larebo	port entrecux petra de lalarb Golf de stora STORA telizem aucol giberame marza saydo GIGER	entri cossi petra delarebo STORA ALCHOL maçaron ZIZARI	p: tre cruce c: de ferro G: de stora STORA talinesi ALCOLLO c: bugiarmi GIGER y de caualli balafia gient mensoria c: bugia BUGIA y de pisani c: carbo
stora temoran	marzararon balafia	maçaron ZIZARI ballafia	bugia BUGIA p: bugia BUGIA y de pisani c: carbo
manxolia g. de buzia BUZIA pixan carbo	mansoria Golf de bugi BUGIA carbon	mansollia G. de buçia BUÇIA pixam carbo	bugia BUGIA y de pisani c: carbo

Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.
2. iafio	zafon	iaffo	
1. garbello	garbel	garbello	
TITELLIS	TEDELIS	TITELLIS	TADELLIS
benganelo	berengero	benganeto	benigent
merola	merola	merola	matrulla
mitifue	metifux	mitifus	c: matafus
manxol	mentor	manssol	mensora
ALGUER	ALGER	LALGUER	ARGER
caxine	caxines	cassine	
	bixmeo		uasma
baral		baral	
	mirom		
c. batar	cap de laibatal	c. de batar	c: batar
sorcelli	CERCEL	sorçellj	CERCEL
soraco	malsolaz	soraco	marsolac
BRESCA	BRISCH	BRESSCA	BRISC
aucor	aochor	aucor	alcor
montexmet	mon simiel	montessinet	M: simie
TENEXE	TENES	TENEXE	TENES
y: di colombi	coloms	y: a dicollonbj	y de colunbi
c. de niza	cano juog	nige	c: uix
	tadra		
silefo	silefo(?)	sileto	
mostegrans	MOSTEGANI	mostigranj	MOSTAGAN
marzagrans	masagrani	marça granj	mansagrani
	tigismach		tigismac
ARZAU	ARZEU	ARZAU	
c. feralon	CAUO FERAT	c. feralom	c: ferro
ORAM	ORAM	ORAM	ORANO
marzaquibir	marza chebir	marçaquibir	maziachibir
c. falcom	cap de falco	c. falcom	c: falco
aucoceba	argozeba	aucoceba	
	aquabiba		
figalo	cap de figal	fig	c: figel
SIEREM	SEREM	SEREM	CECENI
			c: ceceni
			y limacelli
limacs	limachs	limacs	
gordanza	gordanca	gordanca	
OMNE	ONE	ONE	ONNE
guardia		guardia	guardia
tigonti	tegon	tigonti	tegonisi
tabauars	tabar	tabauarj	teboria
miluina	miluya	milluhina	
zafarins	jaffarim	çaffarinj	lifarini
saline	salines	salline	salini
MILLELLA	MILLELLA	MILLELLA	MELLELLA
c. de tre force	cap de III forchs	c. de tre force	c: tre forchi
LARCUDIA	LALCUDIA	LARCUDIA	ALCODIA
fetis	2. fetix	fetis	
tarfocirat	1. tarfoquirat	tarfocirat	tarfoguera
	tarfo gare		tarfogarolo
molcemar	MOTZEMA	MOT ÇEMA	BUZEMA
buzentor	buzencor	buzentor	bucencor
bedis	BEDIS	bedis	BELLIS
ellis	ellis	ellis	ellis
cassa	saltezza	gabressa	salzata
			querquer
cricer	TERGA	TARGA	TARGA
netigara	netegala	netigara	uetagali
tarfoneli	tarfo noli	tarfanollj	tutuan
	rif		
gomiera	gomera	gomiera	gomera
SEPTA	SEPTA	SEPTA	
marzamua	marzamusa	marzamua(?)	
	caser		alcazar
mitar		mitar	
tancer	tanjer	tanze	
sparteli	spartel	spartil	c: spartel

Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.
II. Islands in the western part of the Mediterranean.			
A. Islands near the coast of Spain.			
a. Iviza.			
santo laria	EUIZA	EUIZA	IEUIZA
tagomago	sca eularia	sco laira	
portinac	tagomago	portinac	tago mago
	portinas		
	valanzat		
p. magno	port may	p. magno	
coniere	conieras	coniere	
ueio	uetra	uetrano	
b. Majorca.			
maiorica	MAIORCA	MAIO	MATOLICA
poraza			
tarfilenpa			
pin			
	palomera		
soiari	soler	soiarj	
formentor	formentor	formentor	
larcudia	... udia		
petra	petra		c: de petra
menator	menacor	menacor	manacor
p. colombo	p. colom	p. colonbo	p: palonbo
p. petro	p. petro	p. petro	p: petra
saline	salines		
c. bianco			
	coruo		
c. Minorca.			
manorica			MINOLICA
maon	mao	maon	p: mao
	CIUTADELA		
	senija	senigiles	
	fornels	fornels	
d. Small adjacent Islands.			
formentera	formentera	formentera	formentera
cabrera	cabrera	cabrera	cabrera
dragonera	dragonera	dragonere	
laira		laira	
moncolonber	moncolubre		cabreti
B. Corsica.			
sanguinara	AVAZO		IAZO
polo	polo	[s. polo] ²	
elexe	orexe	elexe	
fin	figar	[cao fin]	
BONIFACIO		BONIFACIO	BONIFACIO
cinarca			
	sca amanza	amanca	
p. uechio	port uey	[porto ueio]	p: uechio
ciprian	ciprian	[ciprian]	
	fauoni		
lena	LERIJA		
	cotri		
c. corxo	cauo corso	[c. corso]	BASTIA
	centui	[ceniri]	c: corso
	NEVO	[neio]	
florentinam	florentina ²		S: FLORENZO
	loro		
	CALUI	CARUI	CALUI
			galera
monti	mont de sa...	monti	
laite	layte	late	
saion	saon	saion	
	ci...rca		

² Instead of some effaced names on the chart by GIROLDIS, I give, within [], the corresponding names from the atlas by ANDREA BIANCO, 1436.

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
C. Sardinia.			
CALARI	CALLARI	CALLARI	CAGLIERI
c. tera		c. tera	c: depula
	stagno		
	spartiuent		
p. malfitan	port malfeta	[porto malfetan]	
y. roxa	ila rosa	[ya rosa]	
c. tauolar	cap de taulat	tauolar	c: taularo
p. de bote		p. bote	
solxo	sols	[solso]	
	lotar		
	argentera	[arzena]	
napoli	port de napol	napoli	c: napol
ORESTANO	URISTANY	[ARESTANO]	ORISTANO
c. san marco	cauo sa march	c. scō marco	c: s. marco
saline	salines	salline	salini
pizanco	pizanco	[pizanco]	pisanco
BOXA	BOSSA	[BOXA]	BOSA
maraco	maraso	[maraco]	marao
LARGUER	LALGERO	[LALGIER]	LARGIER
	norapenes		
p. del conte	lo conte	[porto de conte]	p: conte
galia		[la galia]	
	argenter		
falcon	falconayre	[falcon]	
P. TO[RRES]	tore	[tore]	p: toro
			SASARI
frixati	frexa		
roxa	ila rosa		
	scā re . . ara	[s. re . . ra]	
longosardo	langon sardo	[longo . ardo]	longo sardo
buxinara	buxinayre	[buxina . .]	
ceruo	p. ceruo	[ceruo]	p: ceruo
			TARMOUA
	polo		
figar		[figar]	
	forceli	.....
fauo	coa de caual		c: canello
roxa			
poxa	possa	boxa	
scā lucia	scā lucia	scā lucia	
comin	cauo de com . .	[comini]	c: comin
orixe	orexe	orixe	
c. samto	mont scō	cauo santo	M: santo
aguiastro	aguiastro	aguiastro	UGLIASTRO
arbatazer	albatasera	arbataser	
scortiger	scortixel	scortiger	
quira	chira	quira	
ferato	cauo ferat	ferato	
carboner	carbonyre	carbonar	c: carbonaro
	saline	saline	
D. Sicily.			
PALMA	PALERMO	PALERMO	PALERMO
sorente	soranto	[soriente]	sofanto
TERMEN	terra noua	[termen]	termini
biliana	bilian	[biliana]	
SIFALU	CIFFALU	ZEFALU	ZIFALU
quirbo	rasaquiribi	quirbo	
	tossa		
caronia	calonia	[caronia]	caronia
			s: marco
rolando	cauo volando	[rulando]	c: dorando
	calui		
PATI	PATI	PATI	patti
	tenda		
oliuer	oliuer	oliuer	
radanco	radazo	radazo	
MELAZO	melaz	MELAZO	melazo
smirtela		smirtila	
MESINA	MESINA	MESINA	MESSINA
tauarmina	taumena	tauermena	tauormina
iazi	iaci	iaci	

A. E. N. II.

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
CATANIA	CATANIA	CATANIA	CATANIA
SENTIM		G. de catania	
		LENTIN	
	ditamon		c: molini
labruca		[labruca]	
	punteria		
AGOSTA	agoastro	[AGOSTA]	LAGUSTA
p. ueio		[porto ueio]	s: lucia
SARAGOXA	scalagrega	SARAGOXA	SARAUSA
rascanzir	rasaganzir	[raxcanzira]	
bendicari	bicar	[bendicari]	
c. pasza	cauo paser	[cao pasaro]	c: pasaro
rascaram	2. rasacarami	rascaram	
manfreda	1. manfreda	manfreda	
botera	4. butera	botera	
ta noua	3. tera noua	TERA NOUA	TERRANOUA
piera		lapiera	
	salso		
LICATA	licata	LICATA	licata
c. blanco	cauo ianco	c. blanco	
ZIRZENTA	girgent	[ZARZENTA]	GIORGENTI
SIACA	xaca		SACA
fontane	III fontane	[fontane]	
MARXARA	mazaira	MARSAR	
MARZARA	marzaira	MARZAR	marsala
s. todaro	scō dero	s. todaro	
TRAPANO	TRAPENA	TRAPANO	TRAPANI
			c: s: uito
alcamo			
	galo	galo	
E. Other islands in the western part of the Mediterranean.			
a. Islands off the coast of Africa.			
aubolam	elboram	anbollam	alborano
galata	galata	gallata	galita
canis	canis	canis	
quillo		quillbj	cherchi
zemolo	zemol	zemollo	
b. The Tuscan Archipelago.			
meriora		[menora]	
gorgona	gorgona	gorgona	gorgona
capraia	crauyra	capraia	cabrera
lelba	leuba	lelba	LELBA
planoxa	planosa	planoxa	pianosa
porzi		[porci]	
formige	formige	formige	formicoli
monte xpo	monte x	monte xto	m: Cristo
zilo	zigie	[zilio]	
ianuti	ianuti	canuti	
c. Islands near Naples.			
palmarola	palmayra	[palma . . .]	palmarola
ponxa	punza	[ponxa]	PONSA
bentitien	bentete	[bentet . .]	betentini
prozita		[procita]	
iscia	iscla	[ischia]	ISCHA
nixari			
capre	crapi	[chap . .]	
tim			
d. Lipari isles.			
lustiga	vsstega	[lustiga]	lustrigo
alcudi	alicur	algudj	alcudi
filicudi	felicur	filicudi	filicudi
salina	saline	[salina]	salini
lipari	lipari	[lipari]	LIPARI
bolcan		[bolchan]	
panarea	. . nanea	[panarea]	
strombolo	strangoli	strombolij	strombulo

Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.
e. The Aegades.			
porzi euiza maretemo fagagnana	leuiza maremo fagagnana	porçi euiza maretemo fagagnana	leuanto maretimo fauognana
f. Islands near Sardinia.			
serpentara murara tolara axinara santermo cozia de dona maliuentre sanpiero palmadexol uaca toro	serpentinaire scō petro tor	serpentera [murera] [tolara] [...nara] [santermo] [cosia de dona] maliuentre scō petrj palma desol uaca toro	serpentere lasinara s: PIERO satioco uaca toro
g. Islands between Sicily and Africa.			
pantalaria gozio comin mallta piper limoxa scola lanpedoxa beito cercenj gamelara	pantalanea goy malta marsasiloch piper limossa scola lanpossa elbeit cherchens gamalera	pantelarea goço comin MALTA marsasiroco piper limoxa scola lanpedoxa beito le chercene	pantalarea gozo MALTA marsasiroco piper linosa lanpidosa CHERCHINI
12. Islands in the Adriatic.			
birfoni galiuola nia sansego y. darbe nieme guia ya de pago premuda sierda zampontelo melada san stefano p. alega templi lincorona preueixo paiara lizuri arcanzelo lazarola solta labraza liexna torcola lixia milixelo	veglia nia sanxelo vadagosta albi(?) neome pago pormoir scherda ianpontelo melada templi lincorona preuerso iuri sorta braza lezna(?) torta lissa melixelo	briony ¹ galiola nia sansego ya darbe nieme ya de pago premuda scherda zanpontelo melada san stefano porto alega templi lincorona prouerso paiara lizuri arcanzelo solta labraça liexna torcola lissa melixelo	briori ² galiola y de ueia unia(?) sanseco y de arbi s: piero di nenbo y de pago premua scherda zanpitello melada y LONGA templi incoronata prouichio pasara azuri s: arcanzelo siolta BRAZA LESINA torcula LISSA

Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.
santandrea buxio curziola caza cazuol lagusta p. roxo lagustinj meleda ziubana calafota santandrea pelegoxa cinazi tremedo saxno ³	scō andrea buxa scurzola caza cazola agosta agostin melada pelagossa plenaso trimidi s...xina	scō andrea busso caça cazol agosta agostini meleda zubana callamota scō andrea pelegoxa cinazi tremedo saxno	s: andrea s: angelo buxa CORZULA caza cazol lagusta agostini MELIDA giupana calamota s: andrea peligosa sasino
13. Ionian islands.			
fanu merlere p. timon formige corfu pacaxu ducato sanxidro uardanj zinfalonia ziant nata striuali prodo sapiencia caurera san venedego ⁴	tano curfo paciso duchato scō sidro guiscardo ciffallunia iazanto nata stanfarie sapiencia craua uenetico	fanu merlere p. timon formige corfu paquissu scō xidaro uardani zefalonia çante nata striuallj prode sapiencia caurera uenetico	fano merlere CORFU pacso c: s: sidero guardiani ZIFALONIA ZANTE striuali SAPIENTIA craua uenetico pasqualigo
14. Large islands in the eastern Mediterranean.			
A. Cyprus.			
FAMA GOSTA s. ziorzi saline p. roxa quito uaxilipos maxito galimen LIMIXO c. gauata piscopia uedima c. bianco coru BAFFA trapano sanbifanio san ziorzi	FAMAGOSTA ¹ grega adena saline quito maxito gallimem LIMISSO gauata piscopia cauo janco BAFFA trapano sci bifani	[FAMAGOSTA] ⁴ s. zorzi saline ponta rosa quito atanas 2. maxeto 1. gallimem LIMISSO gauata piscopia uedima c. bianco cella BAFA trapano scō befanio scō çorçi	FAMAOSTA c: lagreca c: ziti BAFA s: bifanio

¹ Some of the names in the 3rd and 4th col. are from the chart of the Adriatic in the atlases by GIROLDIS and VOLTUS.
² On the portolano of Luxoro there are also the following names of small islands and rocks in the Adriatic: *uescoveli, san nicolo, longa, sanziane, uiruda, ziazi, santa maria, loro, maradori, gozi, lacroma, sanpiero, zanizo*. — Some of these names also occur on the chart by GIROLDIS.
³ There are also on Luxoro's chart the names of *cervi, saranda* and *cuzolari*; on Atlas Catalan *tera, trapano* and *suara*.
⁴ According to the chart by ANDREA BIANCO.

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
cornaquito	cornaquito	cornaquito	sirena
scordili	quarnar		
s. andrea	cilinixi	sgordillj	
marmora	cauo scō andrea	c. s. andrea	c: sa[n]ti andrea
		marmora	

B. Crete.

CANDIA	can[dia]	CANDIA	CANDIA
s. ciane	san zoan	s. zane	s: giorgi
spinalonga		stina lo...	spinalonga
SITRA		SETIA	STIA
pollicastro		pollicastro	
	cap del salmo		c: salamoni
		faro	
scargado	descaregio(?)	scargador	calismeni
scalolimena	calolimea(?)	calollimena	ALICA
litro		s. zan litroc(?)	c: s: ioanni
s. ciane	cauo.....		
ganbruxe	canbrosa	ganbrusa	
spada	spati	c. spata	c: spata
CANIA		CANIA	CANEA
		meleca	
		lasua	suda
			c. soso
RETE-NO *		TERNO	

C. Euboea.

NEG[RO]PONTE	[NEGROPUNTE]²	NEGROPO	NEGROPONTI
caristo	[castri]	castri	
s: giorgi		s. gorgi	
T. EDO	[loreo]	LOREDO	
litar	[litar]	litra	
creta		creta	
		pondicon	
	[uelona]	uellona	

15. Small islands in the eastern Mediterranean.

A. North of lat. 39° N.

taxo	[taxo]	tasso	tasso
	[mādraqui]	samadraqui	
lembro	[enbro]	enbro	lenbro
scati	[scati]	scati	scatto
		rati	
scopulo	[scopolo]	scopolo	scopulo
dromo	[dromo]	dromo	drome
siraquino	[saraquino]	saracino	
sor		seror	
scandolo	[scandola]	samdolo	scandola
limene	[limē]	imone	limno
arxura		arsura	larsur
algura		algura	larger
piper	[piper]	piper	pipe[r]
stalimeno	[stalimē]	stallimene	STALINNO
sanstrati		scō strati	s: strati(?)
tenedo	[teneo]	tenedo	TENEDO
maure		maune	
metelino	[mitilino]	metel..	METELINO
secimi			

B. Between 38° and 39° N.

sciro	[schir]	sciro	SCHIRO
cologria	[caloiaro]	calloiro	calocro
pisera	[pissara]	pisera	spara
sio	[sio]	[sio]³	SIO

Anon. 14th cent.	Atlas Catalan 1375.	Giroladis 1426.	Voltius 1593.
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C. Between 37° and 38° N.

setepozi			
sidra	[sidra]	sidra	SIDRA
enia	[egina]	eina	
gaderonix		gaderonis	
albara		albara	
macarix	[macronis]	macronisso	MACROMISI
cia	[cia]	cia	zia
ferminia	[ferminee]	fermenie	fermia
s[er]fone	[serfine]	serfene	serfano
		iuque	iura
andre	[andri]	andre	ANDRI
tines	[tim]	tine	TINO
sira		sira	sira
stiles		stilles	
antipario	[antiparis]	antipario	
pario	[paris]	pario	PARIS
nicoxia	[nicosia]	nicosia	NICSIA
tenoxa	[tenosa]	tenoxa	
micole	[micule]	micolle	nicone
draconixi			
stopodia		stopodia	roco
nicaria	[nicaloa]	nicaria	NICARIA
			rato
leuita	[liuida]	leuita	
palmoxa	[palmosa]	planoxa	patino
corxi		croxi	
fornoli		forni	
samo	[sxamo]	samo	SAMO
mandria		madira	mandra
lero	[lero]	loro	lero
calamo	[calamo]	calimo	cosmo
gatonixi	[gatonisi]		
fermaco		fermaco	

D. Between 36° and 37° N.

louega	[louo]	ouega	
zezerigo	[cēc]	zerigo	ZIRIGO
axi		assi	
pola	[pola]	belapolla	belopola(?)
carauj	[carau]	carauio	carau
falconare	[falconaire]	falconera	falconara
antimilo	[antimil]	antimello	
p[a]qu[i]mada	[pasima]	passimada	ananea
melo	[mil]	mello	MILLO
			ananea
remo milo	[ermomil]	remomelo	ermoli
quimano	[quimino]	quimano	argentera
polimo	[polimo]	pollimo	polino
petenj		peteni	petraia
sifano	[sifano]	sifano	sifano
st[ron]gilo			
policandro	[policandro]	policandro	policando
sicinio		[sicino]³	sicando
nio	[nio]	[nio]	NIO
c[ris]tiana	[cristiana]	cana	cristiana
santorini	[scō elin]	[santorini]	senturi
lanera		anera	
caridia		[caridia]	
mergo	[margo]	mergo	MARGO
cinara		zenere	
nanfio	[nanfo]	nanfio	nanfio
stinpalia	stinpalea	stinpalia	STANPALIA
conupi		conup	
plana		plana	
zafrana	safrane	çafaran	cafano
			s: giorgi
serpe	serpe	serpe	serpe

* On the portolano of Luxoro there are also the names: *c. lion*, *contarini*, *bicornia*, *s. salua tor*, *frascia*.

² The names of these islands are effaced on the Atlas Catalan. They are here inserted, in [], from the portolano by DULCET.

³ According to the chart by ANDREA BIANCO.

Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.
placida		placida	
scrofa	scrofa	scrofa	porzi
porcelli		porgi	
lenxidra		lensidra	
cirana		chirana	
piscopia	piscopia	piscopia	piscopi
nixari	niseri	nixari	nizari
uero			
gira		gira	
caura		cabra	cabra
lango	lango	lango	LONGO
rodo	RODUS	RUODO	RODI
	traquilo		
lendego	lendego	lendego	
carquj	carqui	carqui	carcari
simie	simie	simie	
limonia		limonia	

E. Between 35° and 36° N.

poro		poro	
zezerigo		zezerigo	zirigotto
gua(?)		gira	
turliru		tolloru	
standia	standia	standia	STANTIA
louo	louo	ouo	
deuonia		deuonia	
caxio	caxo	caxo	
canj		cani	
staquida		staquida	
scarpanto	scarpanto	scarpanto	SCARPANTO
saria		saria	

F. Between 34° and 35° N.

gozio	[gozo]	gozo	gozo
caure	[caura]	cabre	cabreti
gaderonj	gaydelonis	gaderonis	gaidaroni
cristiana	crestiana	cana	cristiana
farioni		farioni	
morena		morena	

16. The northwestern coast of Africa.

arcilla	ARZILA	ARZILLA	ARZILLA
tagonixi	tussi mussi		
LARAQUIS	larax	ARAXI	laraci
moxmar	moxmar	mosmar	
			LAGOMAS
			forrello
marmo	mamora	mamora	mamora
SALLE	SALLE	SALLE	SALE
			al . . nsora
	rotima	monina	
	.. dala	faidalla	fadala(?)
		NIFE	ANIFE
			c: camillo
	plag . .	plagie	spiagia
	seosor	c. stoxia	c: sezor
	ZAMOR	ZAMOR	AZAMOR
	mesegam	mesigianj	mazacan
	tete	tere	TITE
			c: bianco
	teturit	de turit	
			casar de cauallu
			babuquel
	emender	emeder	
	cauo de cantin	c. de caimia	c: cantino
	SAFFI	SAFFIM	
	gux	gus	
	amen	amam	
	mogodor	mogodor	
	ossem	ossem	
	taftana	taftana	TEFANI
		GUTZOLLA	

Anon. 14th cent.	Atlas Catalan 1375.	Girolidis 1426.	Voltius 1593.
	zebedech	sebechen	
	cauo de guer	c. de guer	
	porto mess	p. de messeginam	c: bianco
	alluetsu	allerssur	
	MESSA	MESSA	
	agu	aguillon	
	alanzin	algaçim	
	samotinai(?)	SAMODAMAT	
	zamain(?)	samaim	
	CAUO DE NO	c. de nora	
	meiust	meniust	
	himifin	humifin	
	ansulin		
	alluetmill	fim ebellimil	
	cauo de sabuny	c. sablon	
	plages arenosses	placie	caladarena
	HIFURET		
	vetenille	linicelle	
	cauo de buyetder	c. de buider	
	BUYETDER	BUIDER	
	danom		
	cap de finistera		
	occidental de af-		
	fricha		

17. Gibraltar to St. Jean de Luz.

IXALCADRE	ZIZERA	ZIZERA	ALSANGIRA
tarifa	tarifa	tariffa	tariffa
tore de uacar	vacar	uacar	
tarfogar	tarfagar	trofogar	c: trafalcar
caades	CADIS	caades	CALESI
SANTA MARIA	port scā maria	SĀ MARIA	P: S: MARIA
rota	rota	rota	rota
lemendina		lemendina	
san luca	san luca		S: LUCARI
SIBILLIA	SIBILLIA	SIBILLIA	SIUGLIA
	CHORIA		
	vardachebir		
	capitor		
	baramida	barameda	barameda
	aranas	aranas	arenasgorda
	nebla	nebla	niebla
	gleabarom	2. gibrall	gibalcon
		1. saltes	SALTES
	arcadebom	arca de bo	s: miquel
	tuta	tuta	.....
	guardiana	godiana	odia[na]
			aioment
	tauilla	tauilla	artauilla
	FARAON	FARAUM	FARAOM
			farān
			C: S: MARIA
	bifera	bufera	farabilia
	portes	porces	albufera
	silues		
	lac . .	laco	LAGOS
	cap san uicens	uizenço	C: S: UICENZO
			stixas
	rofina	rufana	
	cezar	o de cesar	
	moxmar	o de mira	
	perseger	perseger	ODENIA
	sines	sines	
	faro	faro	p: siegra
	satuuol	SOTUAL	SETEUBA
			rapit .
	c. pizes	cap de pitxer	c: spichel
			alm
	LISBONA	ARMADENA	
	casca	LISBONA	LISBONA
		casca	cascais

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
cintrexa orciana tiguna carboner	cintes tuguia carboner	cintra orciana tiguna carboner	ROCA DE SINTRA c: carbo sillie petronera
scuo petronero sardanero montedego	petronela c. mondego	pedronero mondego	MONDEGO c: mondego borcos AUCRO boca felgra
boga	boga	boga monte alito	PORTOGALLO P: PORTOGALLO lasoni matasios
PORTOGALLO	PORTEGAL	2. PORTO GALLO	UILLA DE CONTE UIANA
naxom uilla de conti uiena migno baiona de mior redondella ponta uechia loperom corouedo noia muros sea finistera torignam moncia corneo auricio CRUGNA	naxoia villa de viena mignor baiona de minor radondella p. ntauedr. lopeyra. corouedre noia muros sea finistera torignana(?) mongia cormes ... ricio COROGNA	1. naxom uilla de contj uiena migno BAIONA reondella PONTA UDRA corouedo noia muros sea finistera turiana mongia corneo auarico COLLOGNA	BAIONA radondella PONTAUEDRA elpatron noia muro C: FINISTERRA CORUNA FEROL
beanco priora liua cedra ortigera santa matra p. debates UIUERO san cipriam basma RIPATOUA	betan ... prior mina cedera ortiger san	beaco prior zedera c. de ortigera scā matra c. de bares UIUERO scō cipriam bassma RIBADEHO	ortigera c: deuares UIUERO uasma RIBALEO siridaconi latoia arcedo auilles c: lap ... TAZONES
tapia luerca belies pene bormaio lapstris	... ercha gres spenes bomayo ias	tapia luerca arcedo ABILLES penas rires bomaho lartres	uillauizioza riba de cauillo deuanca S: VINCENTE s: martin c: sardinero
ripa de cella lapnes san uinzento san martin	ripa de sela lanpnes san uicenzo san martin	ripa dessella laynes scō uigenço scō martin	S: ANDREA gauosano SANTOIA lataia galetto BILBAO placensa MASALACO BERMES SUMAIA
SANTANDER santo ogna loredo CASTRO	SANTO ANDER galezano santogna leredo CASTRO galletto BIRBAO	scō ANDER gallixano scō onia loredo CASTRO calleto UILUAHO	galetto BILBAO placensa MASALACO BERMES SUMAIA
marziaco bermeo	marchiach bremeo	marciaco bemeho motrico	

A. E. N. II.

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
cutaria SAN SEBASTIAM uarza cauo figo fonta rabia	cataria SAN SEBESTIA vuarza figo fonta rabia	cataria SCO SEBASTIAN uarcia c. figo	GETARIA caraus S: SEBASTIANO pasagio figher FONTERABIA

Islands on the Atlantic coast of Spain and Portugal.

berlenga farionj fiama san martin salua cixarca	berlinga cissarca	berlinga farionj cissarca	
--	--	---	--

18. St. Jean de Luz to Denmark.

san ioan de lixio BAIONA DE UAS- COGNA	san iohan BAIONA DE GASCO- GNA	scō ioan delixe BAIONA DE UAS- COGNA	s: io delix BAIONA DE GASCOIA
arcaxo	archix ...	canberton arcassom ballancam malla	c: bretoni mimosera ARCASONI balania
santa m:ia de solac BORDELLA 2. burg 1. talamon	scā maria de solach BORDEUS BARGO talamon roanj	scā m:ia de sollac BORDEHO 2. burg 1. tallamom	S: MARIA BORDEOS naobingo oco rotuna
maomenzo mers zapuco ziranta ROCELLA	maumesom zapuzo chiranda ROCELLA	4. maomensso 3. mers gaputo arat ORIZELLA	bozani borneque soranda ROCELLA chinfadeboas
plonbo maraca	plunbo maranta	plonbo maraca	agoloni
lora scori sangilli helesagiles nermoster	tordelona sangilli normoster	lora scō gillj belle sazilles nermoster	galante OLONA bellaquas mosster ambon
geleto NANTES santoliazar garanda	golet NANTES saunazar garanda	NANTES scō liaçar garanda graxa broet	NANTES s: nazar GORANDA
broet	port broet	broet	ancoas ARNAS arbiana anbor quepona concrena carapin
conca	cunchet	conçet	PEMART odierna
benidet pomarco odemira fontaneo	benandet stoc de pomarch odierna cauo de fontanao claudon	benidet pomaco o de mira fontanco	
tendom samicer gradom brest	 brest	scō mize gradom brest	BREST PINAR

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
SAMAER forno moieto porzao barbarac	SAMAE forno morleto porzao barbarach	SAMAE forno molieto barbarach	lamas morlat sagetada beuat
baxo meliana san gidaxo	basse meliana san guindanzo rasanbriach	basso melliana scō gidasso rassa in briaco	 brest leto
scō golien torza SAMALO g. samallo	la rossa SAN MALO golfo de samalo	2. scō gollien 1. torssa SAMALLO	SAMALLO
codelaga CIRIBURG sanicolo baiafiet	cur de laga cheriborg san marco ostran CAM toca gofart onefror chiribey	co de laga CHIRIBURG scō nicollo baiafiet CAM tocas barafior	galem c: naus baiafat s: maria aran CAIM toca c: gatar onefai ciribei ONEFIOR ANAFIOR ROAN
toca barafior onclor CIRIBURG	ROAM oyra ced. caus	ROAM orafior c. de caus ficapros(?)	c: caum antifles
abastexi fetecap	fecanp	scō uallerim	G. diepa DIEPA
DIEPA uaban soma stupes	DIEPA vuabam sumam slaps	DIEPA gaspore umant somam estailles	uman suma cain BOLUGA socer CALIS greuelinga
belogna guinzat CALEXE grauelinze	BELLOGNA guinsant calles grauelinges doncherch	BELLOGNA guincan CALLEX grauelinge	ostenda c: catalam
mazico norpoiz ostende blanca uerza santa catarina	nof por ostende branzaberga	eguınca noruge ostende blanca uerga s. catarina	ostenda c: catalam
BRUCES cluxa ANGUERYA ceoret ardreborg	BRUGES la clussa ardenborg breuet	BRUZES ceoret aureborg beruet	brenet SOLANDA greuelat scalis
ZELANDA dodret	SALLANDA greuelet scalt DORDRET	SALLANDA corabelet estaller DORDRET flui noxa massa	min mas c: tauesit
MAUXA sanfordor grauexant	mossa maxa grauessant	scā forda grauessant	

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
UTREC masdiepa uangaroxa HOLANDA lembe	scalingue ardrohic mas diepa uangroga OLLANDA leulie FRIXA aqua ullie insule scē RIPISS DACIA BURGALENSIS	VTRES ardoich masdiepa 2. uangaroxa 1. HOLLANDA lenbe FRIXA y: e sante	UIRCH scalincala ardoise mas diepa umangarosa

Islands on the coast of France.

corban larom regis hoia la badia belila grota glaran saim usenti rocatoua granexi guasquito ramuinj ¹	cordan layron rey hoya la baya balila groia granar sam(?) rochloua granexi gaschetz ranuy	cordan lairom rey uias labaia be . . illa groia glaran saim ussent rocatona guarnaxon casceete renuj	baijas bellaylla 7: illas casquetas ramui
---	---	---	---

19. England and Scotland.

lataya rochburch fert cauo dorado BERUHC tueda banborg sutina SCARDENBORG cauo venbro VLLO vnbro nissa rauenzor san betorf	endiburg fert dorada BEROCH teneda banborg sutina scadeborg c: nenbro VLLO nbro nissa rabenssor SCO BITOR	bambaio SCANDEMARCH c: uerbo UUL c: uul rouenso S: BANTOR G: s: bantor G: delena LENA blacanca cadoco gordane castor LARAMUA tarquellaj arcuorda arois orellem arcord lamixa LONDON samux	canet LONDRA MARGATA
--	--	---	----------------------------

¹ On the portolano of Luxoro there are also the following names of islands on the French coast: *coars*, *orcanie*, *guton(?)*, *balinger*.
² Only part of Great Britain is laid down on Luxoro's chart.

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
romaneo	dobla romaneo	s. dus dobla romaneo canbra	C: DAX
GISALEXIO	GUINSALEXIO	GIXALINEO	GINCALA
befera			c: sendec
belzer	beocep	c. belçet	
saufor	safor..	cafforda	
soram	soran	soram	
ciuita	ciuita	ciuidat	ciutat
portamua	portamua	portamua	pratamua
ambra		anbra	
antona	ANTHONA	ANTONA	ANTONA
balaner	balener	ballaner	
sanpolo	sca polla	sca polla	s: pola
santermo	santo antermo	sco ermo	s: steramo
			ORAMULA
cauo de porlam	cauo de porlan	c. de porllan	c: parlam
saco de porlam	santo de porlan	saco de porllan	
	lim	lim	
tores	tingmua	.. uaniua	tinamua
sanpetioco	tores	tores	torres
ARTAMUA	ARTMUA	ARTAMUA	ARTAMUA
codester	godester	c. de ster	godeste
p: mue	PMUA	PREMUA	PLEMUA
fabie	f...ie	fabich	
codemua		co demua	goacina(?)
	... man		
falamua	falemua	falamua	SCALEMA
lixerta	lisart	c. liserta	c: lixerta
muxafola	musafoia	musafoia	
longaner		longaneo	
PATISTO	patris	patristol	
santa lena		2. sca lena	
BRISTO	BRISTO	1. BRISTO	BRISTOL
san nicolo		sco nicollo	
	uernas	bernas	
			CORNALA
	bremalet	.. masset	
toruaxi			
tingit	tinbech	nuiba	
	s... pol		
carde		carde	
miforde	MIRAFORDA	MIRAFRONDA	MIFORDA
	punbris	pō	
	cauo santo		deue
GALES	VIRGALLES	UIRGALLES	
norgales	NORGALLES	NORGALLES	NORGALES
		tore incanta	bomares
		brens	lampol
		roet	farno
		DONFRES	lonog
		basso	CASTEL
		carcaibij	arles
		sco miçer	cerber
		y: e essair	demoniooc(?)
			denbletan
			cautar
			DEMIFLES
Islands on the coast of England.			
huic	huic	huic	houich
loxei	los..		petra lucia
sorlinga	sorlinga	sorlinga	sorlinge
sete pierre	peres	y: a septe pere	7: petras
glis			
londei	londei	londej	
ramuxain	caldey	callej	
		esterual	
		amana	. de . ai

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
20. Ireland.			
	insula de triconel	aullus	
	cauo seligra	sco guis	
	abram	y: e triconel	
		c. senigla	
		abraam	
		TERA SANTA	
	comincidela	comucidella	
	borderali	burdellas	brotan
	LOCUS FORTUNADUS	locus fortunatus	
	insule lacaris	y: e laçeris	y lacari
	confrenchellan	y: e CCC LXVIII	
		contullaria	c. de quilla
			Y IBERNIA
			y lago
			c: de leme
			s: grigorio
			GALUEI
	erorim		anna
			clasencala
			montes negros
			conagar
	LAYMERICH	LANERA	LAMARIQUI
	cap stronbere	c. stronber	
			c: de s: maria
	sanbrandan	sco brandan	
	ledens	lodenz	DINGLES
			go donec
	drauert	drauert	cornet
	borela		tarca
	drorosey	drössi	
	bire	leri	biara
	cao cauena	cabena	c: dema
			CORZOM
	cauo de clara		c: de Clara
gleabaron	grenberon	greneron	galueram
			beltromor
domborg	donborg	donbor	
			c: uul
olarcos	olarcos	ollarcos	DORCOLA
camalot	camelat	camallut	
c. ueio	cauo ueyo		
adeforda	andelfronda	audefronda	
godeforda	godelfronda	go de fronda	c: deforda
for	corch	ERCOFIDA	
	baillicoti	.....
lioc	liocles	liocla	liocla
dom			
	minart	minar	minart
	grauan	graua	
	ertano		eran
	croc	c...	car
GARAFORDA	GATAFORDA	GATAFORDA	GATAFORDA
GRAUA		garua(?)	
ROXI	ROIS	ROX	AROS
dondab	d... ach	dondal(?)	
fredit	fredit	fredit	fredu
leban	elebano	ellebano	
rixalt	risalt	rissalt	risalt
ocxorda	ocsorda	3. cossard	
rexna	resnax	4. resnas	reinas
arcelo	archelo	1. arçello	
uicelo	vichelo	2. guello	uidiblo
			LANDEI
arecom	arecom	arecom	urem
bre	bre	bre.	
DONUELIN	DONUELIN	DONUELLIM	DONALUI
irlandaxea	irlandesea	irlandaxea	ulancoso
ordez	... des		
losco	... o	lossar	lastog
c: dester	... fetet	c. feret	c: ferat
VNDA			dara
DERO	DROZDA	DROSSDA	DROGODEA

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
DONDAZO	...che	darchen	
	....forda	culreforda	
STANFORDA	....FORDA	STANFORDA	
chenofrit	.....	chenofris	
uerforda	.....	
	...ef...	monexj	momolus
dansobrinim	..nsob...	donssebrin	
	....OSSO	ragranj	
	lebam	lebita	
Islands near Ireland.			
	ardoin	lunium	
	bofin	bofim	
	arim	arim	ÿ de arena
	brascher	bras cher(?)	brasques
			quelbeg
	scalis	escallis	
	lesper dirlanda	lesp. dirllanda	
			boi
			fastanai
	saltey	galiej	

21. The Baltic and the Scandinavian Peninsula.

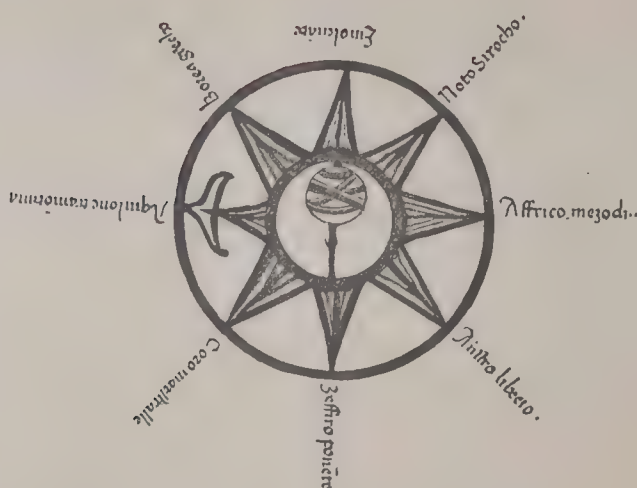
A. The main-land.

UGMARIA
ROYSTOCH
LUDIS MAGNA
GRISVALDIS
GUARPE
STADIN
COLBERG
STETIN
ALECH
LOCUS NERIA
SCORPE
GODANSE
ALBING
NERIE
STAGNO NERIE
CUCENIO
PRUTENIA
CATELANT PAGANIS
LITEFANIE PAGAMS
RUALIA
RIGA
STOCOLM(?)
OSTIA(?)
SOMECH(?)
IFRAC(?)
DONDINA
SCAMOR
SCARSA
MASTRANTO
BREGIS
NIDROSIA
TRONDE

Anon. 14th cent.	Atlas Catalan 1375.	Giroldis 1426.	Voltius 1593.
B. Islands in the Baltic.			
	INSULA DE VISBI		
	VISBI		
	OXILIA		
	BRUNDOLCH		
	RUVA		
	FANSO		
	JANG LAND		
	ERIA		
	FINONIA		
	INSULA SALANDA		

22. Islands in the Atlantic.

insula de til		
insula archania		
le chatanes(?)		
illa de stillanda		
insula de brazil	y:a de braçil	
insula de mam	y:a de mam	
insula de corui ma-	de coruj marinj	
rini		
liconigi	deli conigllj	
SAD ZORZO	y:a de scō çorçi	
insula de la uentira	y:a de uentura	
li columbi	y:a de collonbis	
insula de brazil	y:a de braçil	
	y:a caprara	
	y:a de luouo	
porto scō	p. santo	p: santo
insula de legname	y:e de madiera	MADERA
insule deserte	y:e dessertes	desertas
insule saluatges	y:e saluaçes	
graciosa	graciox	
laregranza	laregrança	
	scā clara	
rocho	roco	
insula de lanzaroto	y:a de lançaloto	
	p. sable	
	p. pa	
maloxelo		
insula de liuegi	liuegi mari	
mari		
	p. cabras	
	poço negro	
	tarasalj	
	p. santo	
forteuentura	forte uentura	
insula de canaria	y:a de canaria	
canaria		
insula de	y:a dello inferno	
insula de gomera	y:a de gomiera	
	y:a dalle pallme	
insula de lo fero	y:a delo fero	



14. Compass-box and compass-rose from a manuscript of DATI's *La sfera*, the first half of the 15th century.

VI.

Portolanos: 3. The sources of the normal-portolano; the date of its compilation. Wind-roses. The invention of the compass.

The list of names given in the last chapter shows that, except for errors of writing and translation, and apart from the differences produced in the manuscripts by occasional additions, want of space, and the ravages of time,¹ the same legends occur along the coasts of "The inner sea" on Tammar Luxoro's portolano and the Atlas Catalan of the 14th century, on Giroladis' portolano of the 15th, and on the one by Voltius of the end of the 16th century. Had space permitted, I might have added, with the same result, columns for the Carte pisane, for portolanos by Vesconte, Dulcert, Pizigano, Benincasa, Andrea Bianco, Battista Agnese, Calapoda, Rusinus, Crescentius, Oliva, in a word for all the portolanos I have examined. But it is not only the coast-legends that are the same; even the set of names, written with red ink, of places considered of special importance to navigators, was not essentially altered during the three centuries that intervened between Vesconte and Voltius, rich though they were in political revolutions.

When to this it is added:

- 1) that the Mediterranean and the Black Sea have exactly the same shape on all these maps (compare pl. IV);
- 2) that a distance-scale with the same unit of length, such as otherwise is used only on the Spanish and French Mediterranean coasts, occurs on all these maps, independently of the land of their origin;
- 3) that the distances across the Mediterranean and Black Sea measured with this scale agree perfectly on the different maps;
- 4) that the conventional shape given to a number of the smaller islands and capes included in the map, as instanced by the drawings in fig. 9, remained almost unaltered on portolanos from the 14th century to the end of the 16th;

then it may be held as completely proved that all these portolanos are only slightly altered and emended "codices" of the same original, which I designate by the name *normal-portolano*.

¹ Dr. S. Bergh has carefully compared the coast-legends given for the Atlas Catalan by Buchon and Tastu with the names on the heliogravure, which of course is quite correct, in *Choix de documents géographiques* (compare p. 25), and has thus found that two to three hundred names are more or less incorrectly rendered in the former work. This affords an objective starting-point for estimating the mistakes that may creep in by repeated copying of such place-names as are here in question.

² Others consider this work to have been written by Leonardo's brother Gregorio (Goro) Dati, who died in 1436.

This original was never subjected to any thorough change or revision by the writers and draughtsmen who followed the trade of chart-making, skilful though they often were. But it has often been furnished with commentaries in the shape of pictures and map-drawings in the interior of the countries, little worthy of the original from a geographical point of view, and with a continuation of the chart beyond the limits of the normal-portolano. In these additions, imperfect and rough though they be, compared with the normal-portolano, at least up to the beginning of the 16th century, we find the key to many puzzles in the history of geography. I shall return to them later on. But before doing so I shall try to determine when and where the normal-portolano was composed, or rather when a number of sketch-maps and reports by skippers, founded on a long experience, were collected and united to form the most perfect map of the Middle Ages, the Iliad of Cartography which we still so highly and so justly admire.

For it is evident, that the work which paved the way for the normal-portolano consisted of rude drawings of certain often used fair-ways along the coasts and of the sailing-directions for skippers trading between the more important places on the coast. No such works are now extant, but I believe that I have found some slightly altered copies of them among the marginal ornaments in some manuscripts of LEONARDO DATI's celebrated cosmographic poem *La sfera*.² LEONARDO DATI was born about 1360 and died in 1425. Of his writings there are extant a greater historical work and the above-mentioned poem, which is written in Italian verse, and in which, notwithstanding its small compass, one finds much important information concerning the ideas held at that time about the shape and situation of the quarters of the globe, concerning mediaeval navigation, and concerning the compass and other nautical apparatus, on which points it is an exception to find information elsewhere in the literature of the 14th and 15th centuries. The work became popular and widely distributed in a number of copies, of

which some are still extant, adorned with marginal-drawings, some of astronomical and cosmographic subjects, others purely geographical or cartographic. These latter drawings are here reproduced, partly on pl. III after a Dati-manuscript¹ of the first part of the 15th century, in my collection, partly on pl. II after SANTAREM's reproduction of the marginal maps on another codex of the same work.

At first glance the maps on pl. III are not very attractive, but if one scrutinizes them more closely, one finds a clear connection between them and the normal-portolano. Thus, the land-contours of the Mediterranean correspond fairly with those of the normal-portolano; so also the names on the coasts that are always written in red are invariably the same as those so coloured on the portolanos. Only in the Black Sea is an exception found: its north coast, which was correctly laid down by the draughtsman of the normal-portolano, was but incompletely known to him who drew the maps used by Dati as marginal ornaments. This suggests that these maps were drawn before the time when the commercial route from Genoa and Pisa to the Black Sea was opened, *i. e.* before the middle of the 13th century.

Such is also the case with the maps reproduced from Santarem, in pl. II. These, however, show considerable differences from the maps on pl. III. They are worse drawn and less complete; on the other hand they furnish the key to the way in which the normal-portolano was compiled. For they contain the necessary statements of distance, although unfortunately, at least to judge from Santarem's reproduction, often with illegible numbers and legends.² If one could get access to many such map-series, it would be of interest to try to reconstruct from them the normal-portolano itself, also to try to find out the connection that possibly existed between such coast-maps and the periplus of the ancients.

A third series of geographical drawings of the same type is published in JOMARD's atlas (pl. IV). It seems to have been introduced merely for decorative purposes, and is therefore of less value to the historian of cartography.

But when and where were these special charts combined to form a normal-portolano, a map that included the whole of the Black Sea and the Mediterranean and that part of the Atlantic nearest the Straits of Gibraltar? With the two to three thousand coast-names that occur on the normal-portolano, the answer to this ought to prove easy to answer to an investigator well-acquainted with the history of the Mediterranean-countries during the beginning of the second millennium of our era. Here, however, we meet the difficulty that the very material that was used and in most cases copied without alteration, at least for certain parts of the map, belongs to a much older period than that when the normal-portolano was composed. Thus, on the oldest copies of the normal-portolano names of cities and harbours long destroyed may occur. On the other hand many a small harbour was well known and important to the coast traveller long before it was mentioned even in the history of its own district. In this respect shelter from winds and access to fresh water played a very important part, as already shown by the Periplus of Scylax and the Stadiasmus.

The following facts however seem to set the date of origin of the normal-portolano between rather narrow limits.

At present among portolanos of the 13th century we know none that is dated; but there are such, perfectly preserved, from 1311, 1318, and 1320. Thus, it may be maintained as certain that the normal-portolano was written before 1311, or in round numbers, before the beginning of the 14th century. *Port pisan*, *port pisam*, or *port pisan*, which is marked on most portolanos of the 14th and 15th centuries, was destroyed by the Genoese in 1290. The normal-portolano must therefore have been compiled before that year, unless this is a case of thoughtless copying from an older map.

As may be seen from Vesconte's maps, from Dulcert's map, and from the Atlas Catalan, the geography of the Black Sea was well known to the author of the normal-portolano, who, as I shall show later on, probably came from some coast-town of the *west* Mediterranean. It would therefore scarcely have been possible for him to draw a map of the Black Sea, as correct as that of the normal-portolano, before the Genoese trade on this sea had begun. A Genoese colony was founded at Caffa in 1266. The Indo-Genoese trade by way of Sebastopolis, on the east coast of the Black Sea, began in the same year. From this it may be concluded that the normal-portolano is of later date than 1266.

A further proof that the normal-portolano was compiled during the 13th century, after the beginning of the predominance of Genoese navigators on the Mediterranean and the Black Sea, is given by the names *p. zenoveze* (on the south coast of Asia Minor) and *St. Ziorzi*. Among the 90 or so places called after saints, that are found on the map (*e. g.* St. Marco, St. Nicolo, St. Polo etc.), variations of the name of Genoa's saint, St. George (St. Ziorzi) occur 13 times, and no less than four of these on the Black Sea.

Even in ancient times there was a light-house at the entrance to Alexandria, and this is duly laid down on *Tabula Peutingeriana*. A light-house at Genoa is spoken of in documents of the year 1128 (UZZELLI-AMAT, *op. cit.* II, p. 35). *Cao de Far* is marked near Genoa on most of the older portolanos, such as the one by Dulcert of 1339, in Atlante Mediceo 1351, Atlas Catalan 1375, and others. Probably this cape (the lighthouse-cape) was also marked on the primitive codex, of which these are copies or translations.

On all the maps of the world earlier than 1300, that I have seen, the drawing of the Mediterranean and the Black Sea is very fantastic, as figg. 3 & 5 show, but is fairly correct on later maps of the world, such as Vesconte's (fig. 6), Sanudo's (fig. 20), Andrea Bianco's (fig. 7), and Fra Mauro's, in all of which the truthful and easily recognised drawing of the normal-portolano is reproduced. The normal-portolano's representation of "The inner Sea" was therefore unknown to cosmographers before the end of the 13th century.

From all this it seems exceedingly probable, that the normal-portolano was produced with the aid of older special charts during the 13th century, probably after 1266, when Caffa was founded.

It is at present difficult to decide what language was used in the normal-portolano. At first TH. FISCHER seems to have thought that the oldest of these works were of Arabic origin. It is for this reason that an Arabic portolano is placed at the head of the chronological list of portolanos kept in Italian archives and libraries and reproduced by Ongania. It was supposed that this map was of the 13th

¹ This manuscript was bought in Rome at the sale of Count Manzoni's books, and it is described in the 4th part of the sale-catalogue, under No. 48. It forms a folio-volume of 80 leaves (0.435 X 0.290 m.) containing:

a) A plate representing the constellations of the Zodiac, surrounding the empty frame of a Ptolemaic map of the world, like the frame of the map of the world in POMONIUS MELA, Venetiis 1482 (vide my Facsimile atlas, pl. XXXI).

b) Ptolemy's map of the world and 26 special maps. The latter drawn in bright colours on *Donis' projection*, and furnished with various inscriptions not belonging to the original, mostly gathered from the legendary literature of geography, to which is added a short index on the leaf *Taprobane*.

c) Dati's *Spera* or *Sfera*, with three eight-lined stanzas on each folio-page. It is here that the broad margins of the manuscript are adorned with the maps reproduced on pl. III and with several other interesting drawings.

² The numbers are Arabic or decimals, which fact is in no way remarkable, since the manuscript in which these maps were included, is of the 15th century. It is moreover worthy of mention that the Arabic numbers were already in use by portolan-draughtsmen in the 14th century. It seems as though these numbers were in general use in ordinary handwriting before they were approved by the learned.

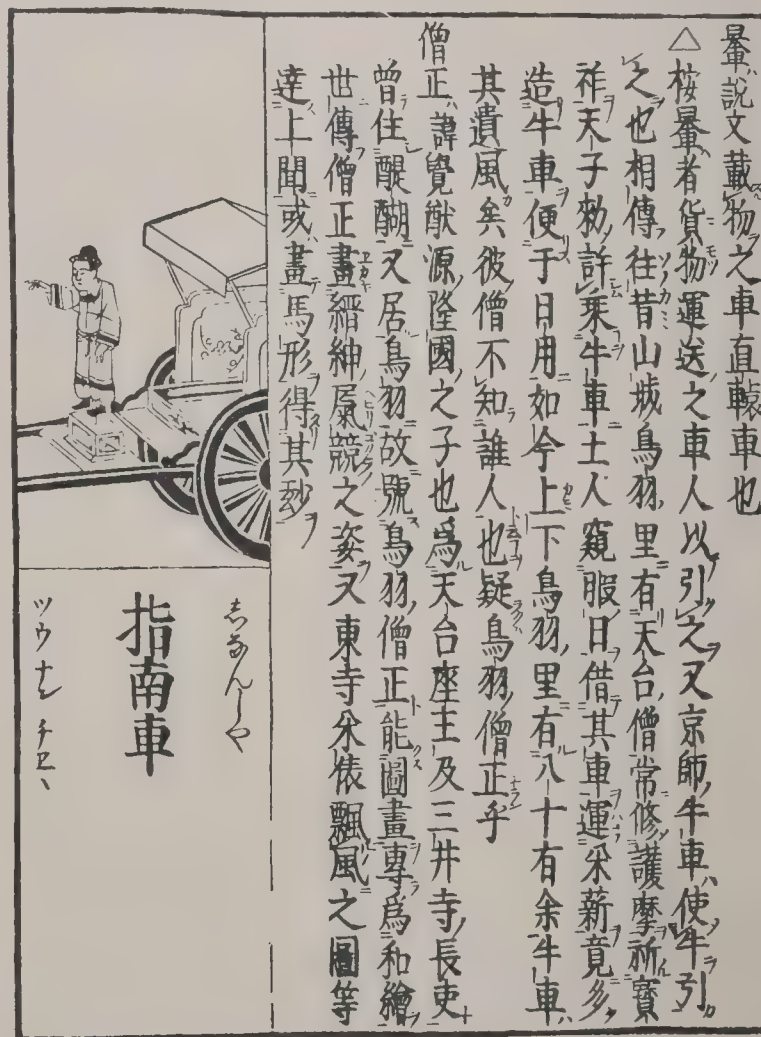
century. But since then FISCHER (*op. cit.*, p. 220) has shown that the portolano in question could not date from an earlier period than the end of the 14th century, and that it was evidently a revision of an Italian chart. I consider it probable that the Arabic chart is a manufacture of a still later date. It is not impossible, that this work, once supposed to be the oldest portolano existing, was only due to the speculation of some portolan-manufacturer in Venice, contemporary with the much-discussed Turkish reproduction of ORONTIUS FINAEUS' heart-shaped map of the world (see my Facsimile atlas, p. 89). Besides, the absolute incompetence of the Arabs in cartography does away with all idea of finding among them the authors of the most perfect cartographic work of the Middle Ages.

FIORINI says in *Le proiezioni delle carte geografiche*, Bologna 1881, p. 648, that the Latin navigators, especially the Italian, shortly after the year 1000, learnt from the Greeks of Constantinople to make and use maps founded on drawings and distances, and that afterwards they gradually improved them. FISCHER comes to the same conclusion in *Nachträge und Verbesserungen* to be found after the *Inhaltsübersicht* in his often quoted work. This may be correct so far as by sea-charts are meant special charts of certain limited districts. But in discussing the origin of the normal-portolano we should remember that the learned of Byzantium scarcely enriched the Greek literature of navigation with a single new and original work, and that the navigation of the Mediterranean, before it began to flourish in Spain and western Italy, was mostly in the hands of sailors from the Greek islands, from Syria, or from the north coast of Africa. No Greek portolano is known, neither is any Greek influence to be detected among the many specimens of language and dialect exhibited in the oldest portolanos. These are written in Latin, in some of the popular dialects of the Italian coast-towns, or in Catalan, frequently in such a lingua-franca mixture of these dialects, that it is difficult to tell which is predominant, or which constitutes the language originally used in the work. Eventually, perhaps, the question may be answered by a linguist fully acquainted with the Romance languages of the 13th century. At present it seems to me probable, on linguistic grounds, that the work is a masterly compilation, by some Latin scholar, from special portolanos written in various coast-dialects by skippers from various ports on the seas represented on the normal-portolano.

As for the question, what country produced this work, so unique in the history not merely of navigation but of human culture, I no longer hesitate to declare that the *normal-portolano* is a *Catalan work*. This view is supported, not only by the many Catalan portolanos known from the beginning of the 14th century to the 17th century, but above all by the distance-scale used on all portolanos, Catalan as well as Latin and Italian (Genoese and Venetian). The unit of this scale does not, as shown above, correspond to any Italian or Latin unit of length, but to the Spanish *legua*.

The relation of the portolanos to the invention of the compass has been much discussed. Several investigators have even considered that the making of portolan-maps was first rendered possible by the introduction of the compass; wherefore it has also been proposed to change the name *portolano*, which is in some respects ambiguous, to the name *compass-map*. But this supposition obviously depends on a mistake. There is no proof that the compass was commonly used by the coasting mariners of the Mediterranean at the beginning of the 13th century; and at first, when the com-

pass consisted of a magnetic needle enclosed in a tube so as to float on water, accurate determination of the cardinal points by means of this was hardly possible on a tossing sea. In the clear atmosphere of the Mediterranean the sun and stars were far safer guides for the navigator: they showed the true quarters without misdirection. A comparison of the contours of the Mediterranean according to various portolanos with a modern chart, as given on pl. IV, shows that the normal-portolano contained no mistake due to the misdirection of the compass. A peculiar piece of evidence is given by ALEXANDER VON HUMBOLDT, when (in *Kosmos*, Stuttgart 1845—62, II, p. 319, IV, pp. 53 and 133) he says that *Andrea Bianco* when preparing his chart of the Mediterranean made allowance for the error of the compass. Bianco's map of the Mediterranean is a faithful copy of the normal-portolano of the end of the 13th century or the be-



15. Magnetic car, from a Sino-Japanese encyclopædia in the Royal Library at Stockholm. (Size of the original 0.209 x 0.155 m.)

ginning of the 14th, and on that drawing the error of the compass has certainly had no influence.

It is probable that, shortly after the compass, supported by a needle and placed in a box of proper shape, was more generally used in navigation, it was covered by a card, on which a wind-rose was drawn. Such a compass-box (N. fig. 14) is figured on the margins of the MS. of DATI'S *La sfera*, previously spoken of. Many investigators, even d'AVEZAC* generally so reliable, have considered the compass-rose to be a characteristic of all portolan-maps. This however is quite incorrect. *There are no wind-roses at all on the oldest portolanos*; later on a solitary wind-rose occurs on each map-sheet in order to indicate the position of the map with regard to the cardinal points, and *not till the 16th century are a number of wind-roses drawn on the same map-sheet*, gene-

* "Elle (la rose des vents) est invariablement marquée sur toutes les cartes nautiques qui nous sont parvenues, et dont les plus anciennes sont génoises et portent la date de l'année 1318: c'est donc, au plus tard, dans l'intervalle de 1268 à 1318 que s'est établi l'usage de joindre à l'aiguille aimantée de la boussole une rose des vents" (*Aperçus historiques sur la boussole*. *Bull. de la Soc. de géogr.*, 4:e série, XIX, Paris 1860, p. 355).

rally grouped in reference to each other like the corners of a regular octagon. That this is the case is shown by the following table:

Table showing the occurrence of wind-roses on portolanos of different periods.

		No wind-rose.	One wind-rose.	A system of wind-roses.
Carte pisane ²	about 1300	+		
Giovanni da Carignano ²	about 1300	+		
Tammar Luxoro's portolano ²	14th century	+		
Petrus Vesconte ²	1311	+		
Petrus Vesconte ³	1318	+		
Perrinus Vesconte ⁴	1327	+		
Angelino Dulcert ²	1339	+		
Atlante Mediceo ³	1351	+		
Franciscus Pizigano ²	1367	+		
Franciscus Pizigano ³	1373	+		
Atlas Catalan ⁵	1375		+	
Pinelli's portolano ²	1384		+	
Guglielmo Soleri, Paris ⁶	about 1380	+		
Guglielmo Soleri, Florence ⁴	1385	+		
Catalan planisphere, Florence ²	15th century		+	
Jacobus Giroldis ²	1426	+		
Andrea Bianco ²	1436	+		
Spoolshaped planisphere, Florence ²	1447	+		
Andrea Bianco ³	1448	+		
Conte Freducci ⁷	1497	+		
Cantino's map of the world ⁸	1502			+
Canerio's map of the world ⁹	1502(?)			+
Diego . . . (?) ¹⁰	1545			+
Georgio Calapoda ¹⁰	1552			+
Battista Agnese ³	1554		+	
Giacomo Russo ¹¹	1557			+
Diego Homen ⁶	1559			+
Matheus Prunes ²	1560			+
Jacobus Maiolo ¹⁰	1561			+
Domingo Olives ¹²	1568			+
Augustinus Russinus ¹³	1590(?)			+
Vincentius Voltius ¹³	1593			+
Bartol. Crescentio ¹³	1596			+
Giovanni Battista Cavallini ¹³	1642			+

The table shows that these additions, which disfigure the actual map, were wanting on the primitive type of the normal-portolano. It is true there are maps of the latter part of the 14th century with but a single, often insignificant, compass- or wind-rose to indicate the cardinal points; but it was during the 16th century that the portolan-copyists began to take delight in adorning their maps with a system of such "roses", drawn in bright colours and therefore so conspicuous that they were considered to give the true stamp to maps of this kind. They have been the subject of a special study in *Il magnete, la calamita e la bussola* by Admiral L. FINCATI, printed in *Rivista marittima*, XI, Roma 1878. Twenty eight wind-roses are there copied from portolanos of the years 1426—1612 in Italian libraries.

A compass indicating both the true and the apparent north is, so far as I know, first represented in [APIANUS]:

Cosmographiae introductio cum quibusdam geometriae ac astronomiae principiis ad eam rem necessariis, Ingolstadii 1529 (at the end the year is given as 1533), pp. 15, 16. Among printed maps the variation of the compass is marked for the first time on the map of Palestine in JACOBUS ZIEGLER's *Quae intus continentur: Syria etc.*, Argentorati 1532; on a printed chart for the first time in *Caertboeck vande Midlandtsche Zee etc.* door WILLEM BARENTS ZON, Amstelredam 1595. Some of Barents' maps are reproduced in my Facsimile-atlas, figg. 21, 23, 24.

The influence that the invention of the compass and its application to the needs of navigators exercised on the spread of the European race over the earth, and thereby on the civilisation of the whole human race, cannot be overrated. It is fully comparable to all that the taming of the magnetic force by the hand of man has effected during the 19th century. Not only did the compass give greater security to the old coasting voyages in the Mediterranean and the Black Sea and to the crossing of them from one port to another, which used always to be somewhat of an adventure, but its introduction first rendered it possible to sail with safety along the coasts of the Ocean, *e. g.* from the Mediterranean to the ports of the north of France, of England, or of Holland, and to venture out of sight of land on this route. The compass consequently was as necessary a precursor of regular navigation beyond the Mediterranean as it was of the re-discovery of the new world by Columbus. On the other hand it was probably the want of the compass that deprived the discovery of Wineland by the Norsemen of all important consequences.

Naturally the introduction of the compass among nautical instruments also influenced cartography, even if not so deeply as they supposed who believed that the true mediaeval charts were always marked with 8 to 16 compass-roses. I therefore think that, without entering into critical details, I ought to give here a short account of the European history of discovery of the magnetic needle. Herein four different stages should be distinguished:

1) *The discovery of a species of stone with polar-magnetic qualities, i. e. with the power of attracting iron.* Only one kind of stone with these qualities, lode-stone or magnetite, occurs in any quantity on the surface of the earth. Certainly pyrrhotite and iron-platinum sometimes are polar-magnetic, but they have been of no importance in the history of the compass. Moreover it should be remembered that most varieties of magnetite are attracted by the magnet without being polar-magnetic themselves. While these varieties are rather common, the polar-magnetic magnetite, which is here in question, is a rare mineral. This species of stone and its power of attracting iron were, however, known to the ancient Greeks, having been discovered, so the story goes, by shepherds who noticed that, in certain places, a heavy black stone was attached to the iron nails of their sandals and to the iron tips of their staves. The discovery probably dates from the earliest antiquity, and is spoken of as a thing of common knowledge by Plato, Theophrastus, Pliny, and others.

² According to a heliogravure in *Choix de documents géographiques, conservés à la Bibliothèque nationale*, Paris 1883.

³ See foot-notes to table on p. 20.

⁴ According to a photograph by ONGANIA.

⁵ According to a photograph of the original which is at Florence.

⁶ According to a heliogravure in *Choix de documents géographiques* (see note 1). In Atlas Catalan the wind-rose bears no relation to the loxodrome-net, but is independent thereof, painted on the map. I therefore supposed that it formed a later addition, but the examination kindly made at my request by M. Léopold Delisle, to determine this point, shows that such is not the case. It is the earliest drawing of a compass-rose that is known, and as may be seen from pl. XI, it is very like the compass-rose still in use.

⁷ According to a reproduction in MARCEL's *Recueil de portulans*, Paris [1886].

⁸ According to a reproduction by SANTAREM.

⁹ According to a reproduction by HARRISSE.

¹⁰ According to a reproduction in MARCEL's *Reproductions de cartes et de globes etc.*, Paris 1893.

¹¹ Portolano belonging to the library of Skokloster, at present deposited in the State Archives (Riksarkivet) at Stockholm.

¹² According to a reproduction in E. T. HAMY's *Note sur une carte marine inédite de Giacomo Russo de Messine* (*Bull. de géogr. hist. et descr.*, Paris 1887).

¹³ According to an exceedingly obscure reproduction in *Catal. de la bibl. de S. E. D. Paulo Borghese*, I, Roma 1892, no. 4620.

In *undecima Asiae tabula*, PTOLEMY introduces a group of islands in the Indian Ocean, alongside which is written (according to the Latin translation of Jacobus Angelus): *Maniolae insulae 10. Hic lapis gignitur Hercules, obque hoc navigia, que clavos ferreos habent, detinentur.*¹ The name *magnes* is said, although probably incorrectly, to be derived from the fact that this stone was first discovered in the neighbourhood of Magnesia in Asia Minor.² Magnetite is, however, by no means common in the countries round the Mediterranean; it occurs more abundantly in Scandinavia and the Ural. Here it should be observed, that the larger coherent masses of magnetite or magnetic ore seldom supply magnets; neither are such to be found deep below the surface of the rock. On the other hand, the smaller nodules of this mineral surrounded by the rock and corroded on the surface through exposure to the air and moisture, are often polar-magnetic. That this stone was brought to France from the North during the 13th century, is related by PIERRE DE MARICOURT in his paper *De l'aimant* written in 1268 (D'AVEZAC: *Bull. de la Soc. de géogr.*, 4^e série, XIX, Paris 1860, p. 353). According to OLAUS MAGNUS there was in the North a special penalty for the man who "malitiose nauticum gnomonem aut compassum & praecipue portionem magnetis, unde omnium (navium?) directio dependet, falsaverit" (*Historia de gentibus septentrionalibus*, Romae 1555, p. 343). So early as the time of Olaus Magnus even the fisher-men on the north coast of Norway used the compass (*op. cit.* p. 730).

2) *The discovery that steel or hardened iron could be made polarmagnetic by rubbing it with a lodestone.* When this discovery was made is not known. No allusion to such an important quality in the lodestone occurs in the authors of antiquity. So late as 400 A. D. CLAUDIUS CLAUDIANUS wrote a long poem about *Lapis cognomine magnes, decolor, obscurus, vilis*, without making any allusion to the possibility of transferring the qualities of the magnet to steel. RABAN MAURUS (died 856) in his great encyclopaedia (XVII: 4) enumerates *magnes* among *lapides insigniores*, likewise without alluding to this.

3) *The discovery that the magnet or the magnetized iron possessed the quality of definite direction, one of its poles always indicating the north, if it were so supported or hung up that it could move freely.* We have no European data for answering the question when this peculiarity of the magnet was discovered, unless we put this discovery together with

4) *The discovery of using the magnetized ironneedle as a compass.* This discovery was long attributed to Flavio Gioia of Amalfi, who lived at the end of the 13th century. The incorrectness of this was pointed out by FORMALEONI (*op. cit.*, p. 40) on the strength of a quotation from Marino Sanudo. Subsequently it has been found out that an instrument (the magnetic car), based on the same principle as the compass, was used in China from early times to determine the cardinal points in the deserts of Central Asia,⁴ also that

the mariner's compass was known in Europe at the end of the 12th or the beginning of the 13th century. The following are the most important data.⁵

GUYOT DE PROVINS in his poem *La bible* written about 1200 expresses the wish that the Holy Father would resemble the pole-star ("la tresmontaine"), which always stands immovable in the firmament and guides the sailor on his pathless track. But when moon and stars are hidden by mist and darkness, he uses another unfailing means of fixing his course. He puts in a small vessel of water a straw pierced by a needle that has been rubbed with an ugly brown stone, which draws iron to itself. The point of the needle always turns towards the pole-star, invisible in the darkness and the mist.

A French prelate and historian, JACQUES DE VITRY, wrote about 1218 in his *Historia orientalis*: "Acus ferrea, postquam adamantem contigerit, ad stellam septentrionalem . . . semper convertitur; unde valde necessarius est navigantibus in mari."

An unknown singer of the same period also praises the advantage that seamen who sail to Friesland, Greece, Acre, or Venice, find in the pole-star as a signpost in the vault of heaven. Even when darkness and mist prevail, it (the star) continues to render the same service, in that it has like power with the magnet to attract iron. To make use of this, an iron needle is attached to a piece of cork and rubbed with a brown lodestone. Then when the needle is put in a vessel of water, it always points to the north.

BRUNETTO LATINI, in a work written about 1260, relates that Roger Bacon showed him a magnet, a stone, black and ugly, to which iron fastens itself. If one rubs a needle with it, and then puts the needle fixed to a straw in water, the point of the needle always turns towards the star, whereby it becomes possible to the sailor to hold a straight course in the darkness of night, when neither stars nor moon are to be seen.

All these passages speak of a magnetized needle floating on water by means of a straw or a piece of cork. This way of making a magnet-needle and adapting it as a compass in a few minutes, may after all not have been so absurd as several writers on the history of the compass have supposed. The following passages from the posthumous writings of another scholar, ALEXANDER NECKAM, seem, however, to refer to a compass-needle placed on a metal point. Neckam was born in 1157 in England, stayed some time at the university of Paris, and afterwards returned to England, where he died an abbot 1217. He has left writings in both poetry and prose. In one of these, *De utensilibus*, is to be read: "Qui ergo munitam vult habere navem habeat etiam acum jaculo superpositam; rotabitur enim et circumvolvetur, donec cuspis acûs respiciat septentrionem, sicque comprehendent quo tendere debeant nautae, cum Cynosura latet in aëris turbatione, quamvis ea occasum numquam teneat propter circuli brevitatem." And in another work: "Nautae

¹ For the magnet the ancient authors used a number of names, among others *lapis Hercules*.

² In the later editions of WAGHENAER (*e. g. Den grooten dobbelden nieuwe Spiegel der Zeevaert*, Amstelredam 160.) a reef, situated to the east of Åbo is mentioned as having, at a distance of a whole mile, a disturbing influence on the compass (see the explanation to the map of the mouth of the Gulf of Finland). A strong magnetic attraction is actually felt in the neighbourhood of Jussarö on the south coast of Finland to the east of Åbo. The spot is marked on Waghenaer's map.

³ On the other hand the city of Magnesia in Asia Minor has had the undeserved honour to give names to two of our most important elements: manganese and magnesium.

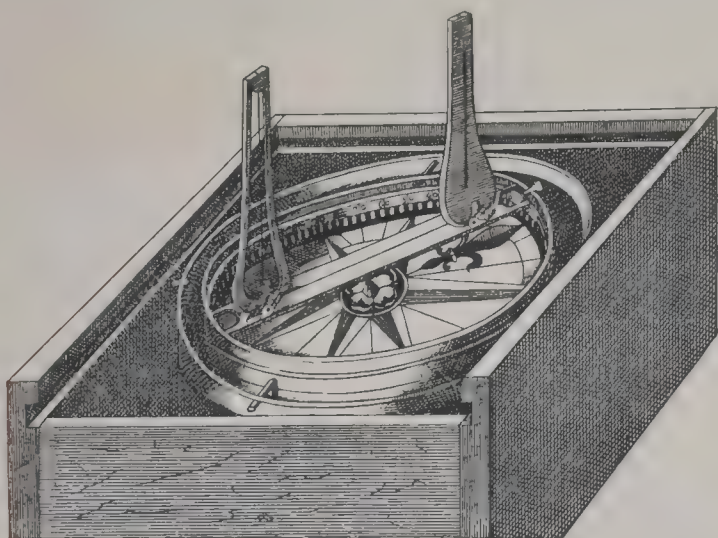
⁴ Magnetic cars were used in China more than two thousand years before the beginning of our era. The art of making these "carriages provided with a pointer showing south" was however forgotten in the great empire of the East, till it was rediscovered in the 3rd century A. D. Later on these carriages were described very minutely, though not very intelligibly, in various Chinese works. For this part of the history of the compass I may, however, refer to KLAPROTH's work (see note 5), also to EDOUARD BIOT: *Note sur la direction de l'aiguille aimantée en Chine* (*Comptes rendus de l'Académie des sciences*, XIX, Paris 1844, pp. 822 et seq.). Fig. 15 is supposed to show a magnetic car. It is taken from a Sino-Japanese encyclopaedia, in the Royal Library at Stockholm (*Catal. de la bibliothèque japonaise de Nordenskiöld*, Paris 1883, p. 261). According to a translation communicated to me through the Swedish Envoy to Berlin, Mr. Lagerheim, the text by the side of the figure does not contain anything that refers to the car being used for the purpose in question. Consequently the author of the encyclopaedia can not have known anything about the instrument he copied.

⁵ Campare D. A. AZUNI: *Dissertation sur l'origine de la boussole*, Paris 1809; M. J. KLAPROTH: *Lettre à M. le Baron A. de Humboldt sur l'invention de la boussole*, Paris 1834; D'AVEZAC two papers in *Bull. de la Soc. de géogr.*, Paris 1858 and 1860; ALFRED V. URBANITSKY: *Elektricität und Magnetismus im Alterthume*, Vienna 1887 (compilation, but with good references); SIEGMUND GÜNTHER: *Johannes Kepler und der tellurisch-kosmische Magnetismus* (PENCKES *Geogr. Abhandl.*, III, 2, Wien 1888).

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etiam mare legentes, cum beneficium claritatis solis in tempore nubilo non sentiunt, aut etiam cum caligine nocturnarum tenebrarum mundus obvolvitur, et ignorant in quem mundi cardinem prora tendat, acum sive magnetem inspiciunt, quae circulariter circumvolvitur utque dum, ejus motu cessante, cuspis ipsius septentrionalem plagam respiciat."

Finally there also occurs in the Northern Sagas a passage which shows that the compass was known early enough among the people of the North. In the *Landnamabok* (Book of colonisation) of Iceland, it is related that Floke Vilgerdsson, on a journey (about 868 A. D.) to Iceland, which had recently been discovered, brought with him three trained ravens, which when need arose, were to be set free, so that it might be judged from their flight if there were land in the neighbourhood. *For at that time the sailors of the Northern countries had not yet any "leidarsteinn"*. The *Landnamabok* was written by ARE TORGILSSON FRODE, who died in 1148. The passage here in question first occurs in a copy or revision by HAUK ERLANDSSON, who lived at the end of the 13th century and the beginning of the 14th. The compass seems to have been so generally used at that time by the sailors of the North that an explanation was necessary why it was wanting on the ships of the early traveller to Iceland.



16. Compass-box from *Arcano del Mare*, 1646.

From what has been said, it appears that the compass and its use for navigation were known in the middle and north of Europe so early as the beginning of the 13th century, and that for a ship-compass, a magnetized needle floated by a straw or a piece of cork, perhaps prepared for the occasion, was in general use. The passage in Neckam is interpreted by d'Avezac as though it referred to a magnet-needle supported by a point. It does not, however, seem to me quite certain that this interpretation is correct.

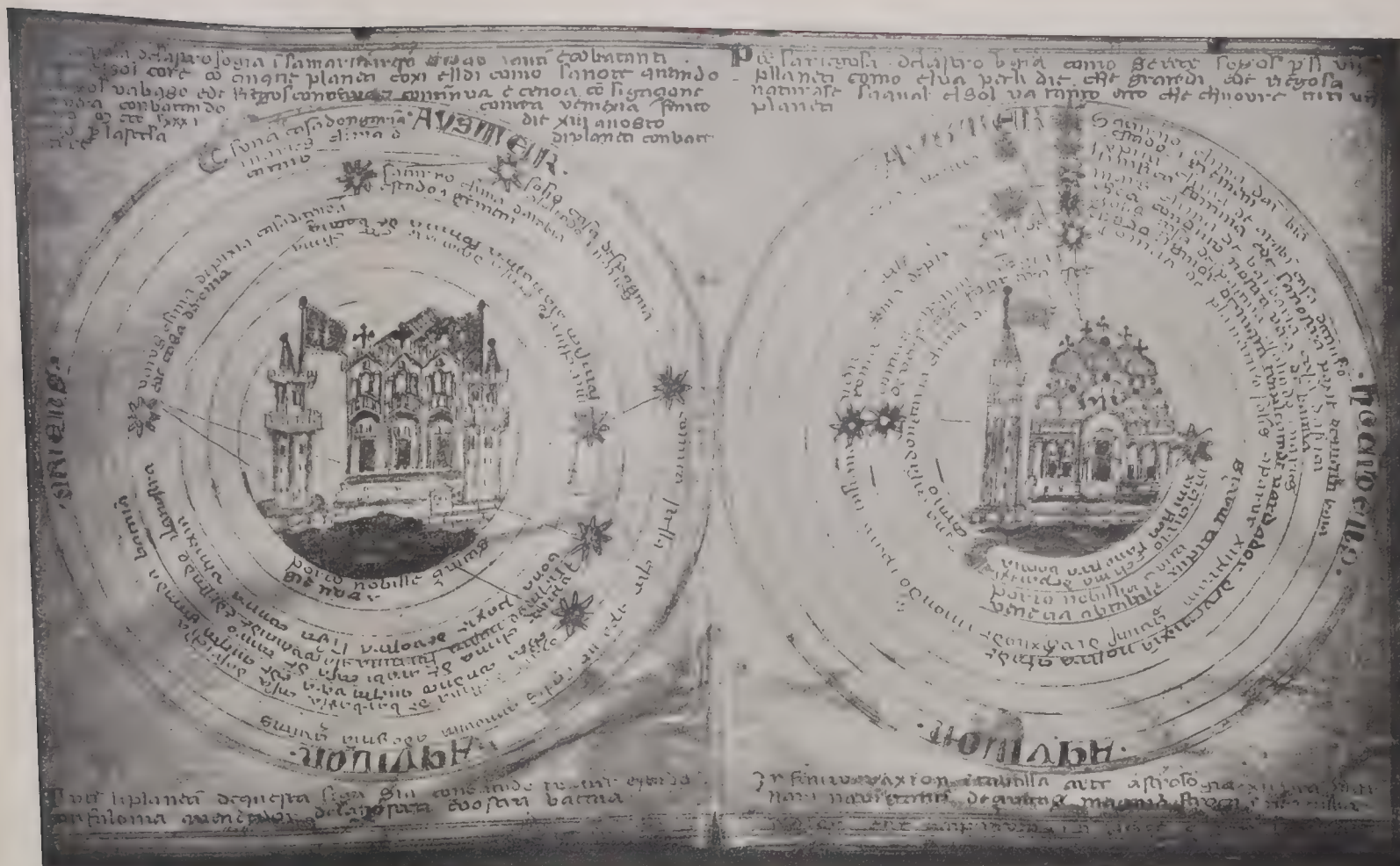
On the evidence of the above quotations, to claim the merit of this great discovery for France, England, or Scandinavia, is certainly quite unjust. These writers have only registered a generally known fact, and it is strange here to have to collect our information from the poets of the South

of France, a prolific English scholar at Paris university, and the *Landnamabok* of Iceland. Since the compass was used in China long before the 12th or 13th century, there is a possibility that it came to us by way of India and Arabia. KLAPROTH (*op. cit.*, p. 57) quotes a remarkable extract from an Arabic work by BAILAK EL KIBJAKI, the title of which corresponds to *Hand-book for merchants in the science of stones*. In this work the author describes how, during a journey from Tripoli to Alexandria in the year 1242, he himself saw how, in order to find out the cardinal points during a dark night, sailors put a needle, stuck crosswise through a straw,¹ in a vessel filled with water and sheltered from the wind, and then magnetized it. The Arabic author further adds, that skippers who sail to India, instead of the magnet-needle attached to a tube, use a hollow iron fish, which, when thrown into water, stands in the direction of north and south. This account is further confirmation of the view that the first used compass consisted of a needle pierced through a tube, a wooden stick, or a piece of cork, and magnetized every time it was used — and that the lodestone itself was the instrument that the navigator brought with him. Before permanent magnetic compass-needles could be made, it was moreover necessary to know the difference that exists between steel and ordinary soft iron in their power of keeping the polar-magnetic quality. This way of determining the cardinal points became known outside nautical circles towards the end of the 12th century. Among skilful sailors the art was probably known long before, perhaps even before the extension of Arabian power over the countries of the East and West.

Subsequently, this simple yet important instrument was improved by degrees, till it finally assumed the shape of a round box, containing a compass needle moving freely on a metal point, and covered by a compass-rose. It was probably as a skilful maker of compass-boxes that Flavio Gioia gained a name in the history of the compass. But that so early as the 13th and 14th centuries the compass should have been used as a ship-compass constantly placed before the helmsman, is hardly probable. At least GIROLAMO RUSCELLI in his *Espositioni et introductioni universali sopra tutta la Geografia di Tolomeo*, Venetia 1561, chapter VIII, accompanying an edition of Ptolemy, says: "Et con haver da non molti anni adietro ritrovato quel miracoloso instrumento del bussolo da navigare per mezzo della Calamita, si vede haver fatto ancor grandissimo frutto alle cose della Geografia." In the same chapter Ruscelli very minutely describes the art of making compasses; he is acquainted with the declination of the compass and suggests how it may be corrected.

That the compass early acquired the shape that still is often used, is proved by figg. 14 and 16. The construction of the compass-rose, on the other hand, is shown by the reproductions of portolanos given in the present work. Here it is to be noticed that completely developed compass-roses, except for the rose on the Atlas Catalan, first appear during the latter part of the 15th century. The oldest compass-roses, *e.g.* that on the Pinelli portolano of 1384, remind one somewhat of a compass-needle stuck crosswise through a straw.

¹ In Italian *calamo*. From this perhaps comes the Italian name for the compass: *calamita*. The Italians also use the name *bussola* (= compass-box). As regards the name of the compass in different languages I beg to refer to KLAPROTH (*op. cit.*, pp. 15—24). Here, however, it may be noted, that the Icelandic name *leidarsteinn*, and *segelsten* formerly used in Sweden, probably refer rather to the stone, with which the compass, when necessary, was prepared, than to a real complete compass. The Dutch *zeilsteen*, the English *lodestone*, and others, had no doubt originally the same meaning.



17. Calendar-diagram, with views of Genoa and Venice, from the atlas by FRANCISCUS PIZIGANO, 1373. (Orig. size 0.25 x 0.25 m.)

VII.

Portolanos: 4. The Calendar-diagram. Directions for tacking (raxon de marteloio). Degree-lines.

Besides a map of the world, charts of the district included in the normal-portolano, and special charts of the Adriatic and the Aegean, and sometimes also of the Caspian Sea, the more complete portolan-atlases of the 14th and 15th centuries also contain calendars and astrological and mathematical diagrams of varying appearance and contents. For the sailor of the Middle Ages, these diagrams took the place of the Nautical Almanac and the nautico-mathematical tables of our sailors; they even gave him medical and astrological advice and information into the bargain. Figg. 17 and 19 and the table on pl. XV give an idea of the way in which the less complicated of such drawings were constructed; of more varied content and more difficult to explain are the plates of this nature in the *Atlas Catalan*, *Atlante Mediceo*, and others. Space does not allow me to enter into an explanation of all the portolan-diagrams I have had occasion to examine. Here, as a guide for those who take an interest in such questions, I shall merely reproduce the explanation given by D'AVEZAC¹ of the diagrams in the

Pinelli portolan-atlas. He shows that in this atlas the first plate, which is now difficult to read owing to rough usage, is a lunar-calendar, including a cycle of 19 years, designated in the first column of the diagram by the first nineteen letters of the alphabet. The first line above the table itself denotes the number of days in each month; the first line of the table itself denotes the initials of each month, according to some Italian dialect. D'Avezac considers the maps to be of Venetian construction, but according to Canale and Desimoni they are of Genoese origin. Probably we have here an Italian copy and translation of a Catalan work. The numbers in the interior of the table indicate in days, hours, and points ("ponti")² the time of the new moon, reckoned with an assumed interval of 29 days, 12 hours, 793 points. For further details concerning this table with its *lapsus calami* etc., the reader must refer to d'Avezac's work and to the reproduction, given on the following page, of the copy that he made with undoubted care and accuracy from the table that forms the first page of the Pinelli atlas.

¹ M. D'AVEZAC: *Fragments d'une notice sur un atlas manuscrit de la bibliothèque Walckenaer* (*Bull. de la Soc. de géogr.* 3^e série, VIII, Paris 1847, pp. 142 et sq.).

² The subdivisions of the hour according to Hebrew reckoning; 18 of them go to a minute of time.

Lunar-calendar from the Pinelli portolan-atlas.

		Zeñohad. 31 .. 31 30 31 30 31 31 30												Regola de la luna.....no .t....t ion.. ...a.....ca...
		Z	F	M	A	M	Z	L	A	S	O	N	D	
Dj hore pontii.	A	2 19 676	.	2 21 102	1 9 985	1 30 9 22 985 608	29 9 32	2. 2 .17	27 1 511	25 13 253	25 2 46	2. 15 759	23	
	B	2. . 515	.	22 18 692	20 7 404	19 20 122	17 21 905	. 8 623	16 10 330	14 23 9	14 11 94.	2.	12 13 ..9	
	C	1. 23 570	9 13 774	10 3 498	6 4 200	8 4 993	17 706	6 418	4 19 132	3 7 925	2 20 638	1 30 5 22 331 64	30 10 858	
1473	D	28 23 570	27 12 273	29 0 72	27 3 788	27 2 500	25 15 214	.5	23 16 7..	22 5 437	21 18 147	20 6 939	16 16 652	
	E	17 20 260	16 21 78	18 . 7.2	15 22 584	15 11 297	15 .. 1.	1. .. .0.	13	11 14 229	11 12 21	9 5 734	9 4 47	
	F	7 17 360	6 5 954	7 .8 7..	6 6 309	. 20 92	4 8 882	. 2. 598	......11..1	29 13 24	29 1 801	28 0 527	27 17 241
1550	G	26 1 1034	24 23 247	25 3 460	23 16 183	23 4 966	21 17 679	19 19 1005	18 7 808	17 20 611	16 9 324	15 2 .7	
	H	15 10 830	12 23 543	14 12 256	13 0 1093	12 13 762	11 2 475	.. 15 188	9 3 981	7 16 694	7 5 694	5 18 120	6 6 913	
	I	3 19 676	2 18 339	. 21 ..	2 9 835	2 31 22 0 556 771	30 9 14	29 12 724	28 1 490	26 13 203	26 2 900	25 5 712	24 4 425	
1458	K	22 17 185	21 5 931	22 18 544	21 7 357	20 20 70	18 8 853	18 21 596	17 10 299	15 18 297	15 11 992	13 0 413	13	
	L	11 21 131	10 9 933	11 . 6..	10 11 258	10 0 63	6 12 854	8 1 568	6 14 281	5 2 1074	4 15 587	3 4 418	2 13 213	
	M	1 30 5 18 105 719	0 6 20 431 134	29 8 939	28 21 651	27 16 114	26 22 76	25 11 870	24 1 1396	23 24 299	22 3 9	21 5 902	21	
1446	N	22 2 1	20 23 228	20 2 1021	18 18 700	17 7 447	17 20 100	16 8 58	14 21 90	13 5 384	12 13 92	11 11 295	11 0 87	
	O	9 13 311	8 2 24	. 14 827	7 3 330	6 23 143	5 4 1036	4 17 749	3 5 462	1 19 175	1 50 7 20 666 682	29 9 394	28 22 107	
	P	27 . 900	26 22 613	27 12 326	26 1 783	25 13 832	24 2 545	22 15 258	22 3 1851	20 16 763	20 5 477	18 8 109	17 6 983	
1446	Q	1. 14 6..	15 8 49	. 21 122	.5 19 915	14 12 618	13 13 345	13 0 54	11 12 847	10 1 606	9 14 277	9 5 65	7 15 779	
	R	6 4 492	4 17 2.5	6 5 909	4 15 721	4 7 424	2 20 137	2 31 8 21 931 144	30 10 356	28 22 58	28 1 861	27 0 575	26 17 288	
	S	25 2 517	.. .5 255	24 3 502	22 16 220	22 4 13	20 16 32.	20 6 419	18 19 155	17 7 948	16 20 661	15 9 374	14 22 418	
1446	T	13 18 880	11 23 694	1. 1. ...	12 1 .9	11 13 812	10 2 525	9 5 239	8 3 1031	6 16 744	6 5 457	4 18 117	4 18 967	

For the sake of clearness I also give d'Avezac's copy of the table in N. T. XV.

Marzo a nome.	v	sol in aries.	fiere in la testa.	a di xxxi.
Avril a nome.	i	sol in tauros.	fiere in la gola.	a di xxx.
Maso a nome.	iii	sol in iemini.	fiere in le brase.	a di xxxi.
Zugno a nome.	vi	sol in canzer.	fiere in lo peti.	a di xxx.
Luio a nome.	i	sol in leo.	fiere in lo cour.	a di xxxi.
Avosto a nome.	iiii	sol in virgo.	fiere in le budele.	a di xxxi.
Sentembre a nome.	vii	sol in libra.	fiere in le ance.	a di xxx.
Otumbre a nome.	ii	sol in scorio.	fiere in verga.	a di xxxi.
Novembre a nome.	v	sol in sagitario.	fiere in le cose.	a di xxx.
Desebre a nome.	viii	sol in capicorno.	fiere in li zenogli.	a di xxxi.
Zener a nome.	iii	sol in aquario.	fiere in ganbe.	a di xxxi.
Feurer a nome.	vi	sol in pisis.	fiere in li pie.	a di xxviii.

Here the number of days in the month is given, to which the table adds various astrologico-medical hints concerning bleeding. The day of the week for the first of each month is obtained by adding the number in the second column to the "concurrent" of the year. The concurrents for a long series of years are given in the upper part of the table on two of the hands there delineated. The legend to these runs: "Cueste do mani son le mani de la raxon del trovare de l'intrata de i mexi." The third hand has the following legend: "Cuesta he la mano del trovare de la raxon de le pasque."

Skilfully worked out astronomical diagrams and calendars, which have been reproduced by lithography in the previously quoted work of BUCHON and TASTU, also occur in the Atlas Catalan and in several portolan-atlases of a later period; they must not, however, detain us here. For specialists in the old calendar-literature they should not be too difficult to decipher, and offer several points of no small interest. For the historian of sea-charts and sailing-directions, on the other hand, they are of less importance. It may, however, be added that in these diagrams (*e. g.* in the diagrams of the Atlas Catalan, 1375, and Pinelli's portolan-atlas, 1384) we meet with possibly some of the earlier instances of the use of Arabic figures to a fairly large extent. Such figures do not occur in the diagrams in Vesconte's portolan-atlas of 1318 or in Pizigano's of 1373 (figg. 17 and 19), which are Italian works. The Pinelli portolano, on the contrary, seems to bear many traces of being a slightly altered copy of a Catalan original.

The power of sailing against wind and wave, and of building ships fit for this purpose, is naturally a main condition of navigation by sails, and its discovery forms an epoch in the history of navigation of little less importance than the introduction of steam in the 19th century. I have, however, tried in vain to get information as to the time when sailors first learnt this art. So far as I can make out, it is not spoken of in the few accounts of Greek or Roman voyages that are preserved; the Greek and Latin languages do not even possess a special name of their own for tacking. Even in the literature of the Middle Ages this way of beating up against the wind is seldom mentioned, unless we may take it that the stories of the dreadful power possessed by the vikings of putting in, even with a contrary wind, to the coasts that they wished to spoil, allude to the northern sailors' knowledge of the art of tacking.

Under these circumstances, great interest attaches to the direction given on one of the sheets of BIANCO's atlas of 1436, how sailors ought to keep their dead-reckoning, *i. e.* how when tacking to calculate the main course of the vessel

* "Raxon de marteloio" is minutely discussed by FORMALEONI (*op. cit.*, p. 44), also in PESCHEL's pamphlet: *Der Atlas des Andrea Bianco*, Venedig 1869. Besides the actual charts and sailing-directions, the portolan-literature also contains manuscript directions for using the *raxon del marteloio*. Such a one came into the possession of the Doge Marco Foscarini, who tried, though in vain, to make out "quella diavoleria di tanti numeri". But shortly after Professor Giuseppe Toaldo succeeded better in his attempt to read the riddle of the ciphers forgotten for centuries. The interpretation of Toaldo has subsequently been followed by Formaleoni and Peschel. The supposition that the numbers on the *toleta de marteloio* were reckoned according to the pythagorean proposition, can not however be correct. It is more probable that the table was arranged on a graphic system.

according to the different courses made during the watches. For this purpose, in the upper corner of the map-sheet in question a traverse-table is inserted (*toleta de marteloio*) with a short direction (*raxon de marteloio*)² how to use it. The explanation of the word *marteloio* itself has much puzzled students of the history of cartography. To me it seems clear that this expression is connected with the custom, still in use on board ship, of marking the time by strokes on a bell. The hours of the different watches were probably denoted by strokes with a hammer (*marteloio*). *Raxon* (*raxon*) is the Spanish word for counting. *Raxon de marteloio* thus means *dead-reckoning during the hour or watch*. The name does not seem to be of Italian, but of Spanish or Catalan origin. *Toleta de marteloio* consists of

una quarta.	20.	98.	una quarta.	51.	50.
una quarta.	38.	92.	una quarta.	26.	24.
una quarta.	55.	83.	una quarta.	18.	15.
una quarta.	71.	71.	una quarta.	14.	10.
una quarta.	83.	55.	una quarta.	12.	6.7.
una quarta.	92.	38.	una quarta.	11.	4.
una quarta.	98.	20.	una quarta.	10.2.	2.
una quarta.	100.	00.	una quarta.	10.	0.

18. Traverse-table in the atlas by Andrea Bianco of 1436.

two divisions, each in three columns. The first and fourth give the deviation (*una quarta* = $11^{\circ} 15'$) from the course during tacking. If this deviation be called *v*, the number in the second column *a*, in the third *b*, in the fifth *c*, and in the sixth *d*, then:

$$a = 100 \sin v; b = 100 \cos v; c = \frac{10}{\sin v}; d = \frac{10}{\tan v}.$$

The table below is calculated according to these formulae. It corresponds with the above-reproduced original of Andrea Bianco, except for some obvious mistakes in the ancient portolan-draughtsman's writing.

The traverse-table of Andrea Bianco re-calculated.

	<i>v.</i>	<i>a.</i>	<i>b.</i>	<i>v.</i>	<i>c.</i>	<i>d.</i>
1 rhumb = 11° 15'	20	98	11° 15'	51	50	
2 " = 22° 30'	38	92	22° 30'	26	24	
3 " = 33° 45'	56	83	33° 45'	18	15	
4 " = 45°	71	71	45°	14	10	
5 " = 56° 15'	83	56	56° 15'	12	6.7	
6 " = 67° 30'	92	38	67° 30'	11	4	
7 " = 78° 45'	98	20	78° 45'	10.2	2	
8 " = 90°	100	0	90°	10	0	

How this table should be used for dead-reckoning is easy to understand without further explanation. Andrea Bianco has made several fine portolan-atlases, and was, according to the signature on one of his portolans, 1448, commander of a Venetian galley in London. The table is dated 1436, the same year that Regiomontanus was born. It may be not only the first known traverse-table, but most probably one of the first known tables of trigonometrical quantities. And yet it is not original, as is shown by the copyist's errors, but evidently, like Bianco's maps, a copy of some older Catalan work, perhaps composed by the great scholar of Majorca, RAYMUND LULL. In the latter's *Ars magna generalis et ul-*

tima, probably written at the beginning of the 14th century, there occurs (edit. Lugduni 1517, fol. 122 v.) a paragraph with the heading: *De questionibus navigationis*. From this we see that the sailors of his time already knew how to keep a kind of dead-reckoning. Lull was born about 1235 and died in 1315. His burning thirst for knowledge and religious zeal led him to undertake distant journeys by land and sea, during which he very likely became well acquainted with the sailor's profession. During the close of the 13th century no one can have been better fitted by comprehensive knowledge and personal experience to compile the results of the observations made during the course of centuries by the skippers of the Mediterranean. The normal-portolano was constructed or compiled at the very time when the powers of Raymund Lull were in their highest maturity, in the country where he was born, where he stayed for a long time, and whither he often seems to have returned from his voyages. It therefore does not seem improbable that Lull was, if not the author, at least the guiding spirit in the compilation of this master-piece. The isle of Majorca, though of little importance in the civilisation of to-day, had an extensive trade during the 13th and 14th centuries, and was a head-quarters for knowledge in the sailor's profession. Charts and nautical instruments were made in Majorca; a Majorcan, master Jacob, was chosen by Prince Henry the Navigator for director of the Academy or school of navigation at Sagres. (Compare HUMBOLDT: *Kritische Untersuchungen*, Berlin 1852, I, p. 239.)

At one time students of the history of cartography considered that sea-charts were invented or first used by the Infanta Henry, *e. g.* PÈRE FOURNIER in an article *Carte marine* in Diderot's Encyclopædia. Later on they contented themselves with giving him the honour of having been the first to introduce lines of longitude and latitude on geographical maps. I have not seen either an original or a copy of the charts used by the great organizer of Portugal's epoch-making voyages of discovery, and therefore do not know if they were divided in degrees of latitude and longitude or not. But even if that were the case, the introduction of degree-lines on maps is of far earlier date. For all the maps of Ptolemy are ruled, and no doubt in this he only followed his predecessors, Marinus, Eratosthenes and others. This method of drawing or dividing up of maps, which naturally is based on the conception of the earth as a globe, was however abandoned during the Middle Ages. And so geographical coordinates do not occur on either maps of the world or the ordinary portolanos of that period. It was not till the 16th century that the normal-portolano was provided with a graduated margin. The statement that the maps of Benincasa and Andrea Bianco¹ were divided with degrees probably springs from a confusion between the portolan-scale drawn on the margins of the maps, and a scale of latitude and longitude. Neither has the division into little squares, that exists in the map of Palestine by Marino Sanudo, anything to do with geographical coordinates. On the other hand, maps of countries beyond the territory of the normal-portolano were often completely graduated from the very first.

The oldest of such maps are the maps of the North, of the type which is first found in the Zamoisky library at Warsaw, and which, as I shall show later on, dates from the 14th century. Such also is the map of the North by CLAUDIUS CLAVUS of 1427 (see my Facsimile-atlas, fig. 27). It is the first chart of certain date, not Ptolemaic, provided with degrees of latitude and longitude. Then later come the revised map of the world and the new map of the North in the editions of PROLEMY, Ulmae 1482 and 1486. These maps are

graduated, but not so the *Tabulae modernae*, which are added to other editions of Ptolemy's Geography of the 15th century. Even the *Germania*, of NICOLAUS A CUSA, Eystat 1491, is completely ruled with meridians and parallels across the map, but not so the revision of this map that was published in SCHEDEL's chronicle of 1493.

After 1500 most maps of larger content were provided with degrees of latitude and longitude, first the maps that led the course of the sailor across the sea to the new world, subsequently also the normal-portolanos themselves. But even during this period the graduation was often missing, *e. g.* on the large map that Alberto Cantino sent to the duke of Ferrara in 1502.

The oldest dated portolanos divided in degrees that I know of, are drawn by BATTISTA AGNESE. However, Agnese has not used degrees for the normal-portolano itself, but only for maps of the East of Asia and the New World, and for his special maps, drawn in the portolan-manner, of Spain, France, England, and Scandinavia. The meridians and parallels are not even here drawn right across the map, but only denoted at the margin, or on the meridian and the parallel that cross one another in the middle of the map. It seems as if the portolan-draughtsman realised the difficulty of applying the cosmographers' doctrine of the globular shape of the earth, and its resultant division into degrees, to his own work based on real experience. The parallels of latitude that were marked on the normal-portolano according to this graduation, did not correspond with the number that was derived from actual observations, neither did the courses that were laid down on graduated charts agree with the experience of a thousand years of practical navigation. Probably it was long before the cause of this difficulty was detected, perhaps not before Mercator. As regards the Mediterranean and Black Sea, however, which have their greatest extent east and west about the same parallels, it made itself less conspicuous, but all the more did it intrude on those sailing on the Northern Seas and across the Atlantic from the neighbourhood of Gibraltar to the northern or southern parts of the New World. An occasional attempt was made to get over this difficulty by the introduction of a double graduation for the countries beyond the Mediterranean. The first map graduated in this way is the above-mentioned map of the North by Claudius Clavus, 1427. The double graduation of this map seems to show that it was based on experience of the voyage from Denmark or the south of Norway to Iceland and Greenland; also that during the early part of the 15th century Northern skippers knew how to make sufficiently accurate determinations of the latitude (or an estimate from the length of Midsummer-day), and during the voyage to keep a sufficiently sure dead-reckoning, to notice the difficulty of navigating these waters with maps graduated upon the equidistant projection of Marinus.

The graduation of maps, based on statements of distance by skippers, was moreover connected with another difficulty—the size of the globe was not known. The graduation would naturally turn out quite differently according as one accepted a greater or smaller value for the length of the earth's radius or for the degree of latitude. Since the portolan-mile, as I have already shown, is a unit, the length of which is known with fair certainty, being fixed by thousands of estimates of distance in the Mediterranean and Black Sea made by sailors practised in such reckoning, and since almost all graduated charts of the 16th century are provided, besides the latitude-scale, with an ordinary distance-scale given in portolan-miles, this gives us a certain indication of the size ascribed to the globe during the 16th century. The more important of the data that I have been able to collect on this question are put together in the following table.

¹ The only graduated map in Andrea Bianco's portolan-atlas of 1436 is a slightly altered copy of Ptolemy's map of the world. Such maps are to be found in several MSS. of Ptolemy's Geography, older than Bianco's portolan-atlas.

The length of the degree of latitude on different portolanos.

	A latitude degree on the portolanos.	The supposed earth-radius divided by the true one.	
		Portolan-miles.	Corresponding kilometres.
Richelieu's portolan-atlas ¹ 16th century	12.6	73.5	0.66
Canerio ² 1502 (?)	16.4	95.6	0.86
Francisco Rodrigues ³ about 1527	14.7	85.7	0.77
Gaspar Viegas ⁴ 1534	14.5	84.5	0.76
Desceliers (Carte de Henri II) ⁴ 1546	14.9	86.9	0.78
Diego Gutierrez ⁵ 1550	13.8	80.5	0.72
Guillaume le Testu ² 1555	12.7	74.0	0.68
Johannes Martines ³ 1567	12.5	72.9	0.66
Jaume Olives ⁵ 1568	14.1	82.2	0.74
Bartolomeo Olives ⁶ 1584	12.8	74.6	0.67
Augustinus Russinus ⁵ 1590 (?)	15.7	91.5	0.82
Bartol. Crescentio ⁵ 1596	17.4	101.4	0.91

the question of Toscanelli's letter to Columbus. It shows that all cartographers at the beginning of the 16th century accepted for the circumference of the earth a length that was only 0.66 to 0.86 of its real length. Not till the end of the 16th century was this number slightly augmented, and then the author of *Nautica mediterranea* admitted a size of the globe only one tenth less than the actuality.

The conception of the size of the earth held during the 15th century by such cosmographers as believed in its spherical shape, is elucidated by the following legend along the lower margin of a map of Spain in the M.S. of DATI's *La sfera*, from which on pl. III I have copied various marginal maps: "[Nota] quod ab India usque ad sacron promontorion secundo Artemidorion est longitudo millia 85 070. Sed secundum Isidron est in longitudo 98 018 millia. Nota quod ex stadiorum 8 miliarium unum faciunt. Nota secundum Dionisidorium in epistula in eius sepultura inuenta refert a centro terre usque ad



19. Calendar diagram from the atlas by FRANCISCUS PIZIGANO of 1373. (Orig. size 0.25 x 0.15 m.)

The table shows the conception of the size of the globe that was held during the 16th century. Here it should be remembered that the size is referred to a fairly well-known measure of length, determined by comparison of sailing-distances in the Mediterranean. It is not the length-measure that is fixed by comparison with the circumference of the earth, but the circumference by comparison with the known length-measure. The table thereby gains the interest of reality, which is lacked by many of the older statements as to the supposed size of the globe, since our knowledge of the measurements on which they are based, as well as of the length-unit employed, is but incomplete. For the history of geographical discovery this table has a special interest through the light it throws on

superficiem esse 5 250 milliaria." The last part of the inscription refers to the story in PLINY (*Historia mundi*, II: 109), that the heirs of the Greek geometer Dionysodorus, shortly after his death, related that they had found in his grave a letter, written to the inhabitants of the earth. In this Dionysodorus says that after death he came to the centre of the earth, and that the distance thence to the surface was 42 000 stadia. This number, the origin of which is characterised by Pliny as "exemplum vanitatis graecae maximum", deviates less from reality than most other statements of antiquity, on the assumption that eight of the stadia here in question = 1 Roman milliarium = 1 479 metres.

¹ According to SANTAREM, who reproduced this map, it dates from the end of the 14th century. The wind-roses and graduation, however, show that it dates from the 16th.

² According to measurements on MARCEL's photographic reproduction (*Réproductions de cartes et de globes*, Paris 1893). The three scales that occur on Canerio's map do not exactly correspond, on account of the parchment having shrunk.

³ According to measurements on SANTAREM's reproduction.

⁴ According to measurements on JOMARD's reproduction.

⁵ Map in Nordenskiöld's collection.

⁶ According to measurements on a reproduction in *Bidrag till Nordens äldsta kartografi*, Stockholm 1892.

VIII.

Portolanos: 5. List of portolanos.¹

A. Portolanos of the 14th century.

14th century (beginning). Anonymous and undated normal-portolano, generally called *Carte pisane* (1.045 × 0.502 m.). Reproduced in lithography by JOMARD, and in a splendid heliogravure in *Choix de documents géographiques conservés à la Bibliothèque nationale*, Paris 1883, in both cases in natural size. Jomard's reproduction is here given on a diminished scale (fig. 10). The determination of age for undated portolanos must be accepted with great hesitation. It is, however, probable that the *Carte pisane* was referred with justice to the latter half of the 13th or the first years of the 14th century. The defective drawing of the coasts of Spain and France bordering the Atlantic Ocean, and above all of the coast of England, suggests a greater age than the maps of Petrus Vesconte and Dulcert. Even the loxodrome-net deviates considerably from that of the ordinary portolanos. It seems as though a map of the East Mediterranean and one of the West had been joined to coast-maps of the Black Sea, England, the countries around Gibraltar etc., without the revision of the loxodrome-net rendered necessary by the combination. The incomplete manner in which the distance-scale is carried out shows in any case that the map is a copy of some older work. The name that Jomard gave to the map, *Carte pisane*, rests on the supposition that it originally belonged to an old family of Pisa, but does not indicate that it is a Pisan work (see E. T. HAMY: *Les origines de la cartographie de l'Europe septentrionale*. *Bull. de géogr. historique et descriptive*, Paris 1888). — Paris Bibl. nationale.

14th century (beginning). **Giovanni da Carignano**. Two maps by this map-draughtsman are quoted.

1) The one is dated 1306, and is said to include specially Central-Asia(?). Its present place of preservation is unknown. (U.-A., II, p. 52).

2) The other one is undated (0.92 × 0.62 m.).² Reproduced by ONGANIA (III) and here in pl. V (according to the original). Minutely described by TH. FISCHER, *op. cit.*, pp. 117 et seq., U.-A., II, p. 49, SANTAREM: *Notices sur plusieurs monuments géographiques du moyen âge* etc. (*Bull. de la Soc. de géogr.*, 3:e série, VII, Paris 1847, p. 289). Signed: "Johannes presbyter, rector sancti Marci de portu Janue me fecit." Desimoni has succeeded in finding out that one Giovanni da Carignano was a priest at the Church of St. Mark in Genoa, 1306, and died in 1344 (FISCHER *op. cit.*, p. 119). The map has unfortunately been badly treated but is of great interest on account of its many peculiarities. The Baltic here forms a long gulf with its main extension from west to east. The Black Sea and Britain have received shapes deviating from those of the normal-portolano. A peculiar character is given to the map by round circles with a diameter of 10—15 mm., set in various places. These enclose heraldic drawings and legends. Similar circles occur on the map of the world engraved on copper or brass and kept in the

Museum of Cardinal Stefano Borgia at Velletri; they have been regarded as countersinks for the heads of the nails with which the map was attached to its mount. As on the *Carte pisane* the loxodrome-net of this map is drawn up upon different systems for the crossing-points in the east and west portions. — Florence, Archivio di Stato.

14th century (beginning). **Tammar Luxoro's portolano**.

Anonymous portolan-atlas, composed of eight charts drawn on parchment (0.15 × 0.11 m.). This remarkably well-made little atlas is a normal-portolano of Italian origin. Carefully reproduced in the above-quoted work by DESIMONI and BELGRANO. This reproduction is here rendered on pl. XVIII, and the legends are introduced on pp. 25 et seq. The same authors also give the modern names of the places that are marked on the portolano. The age assigned to it (the beginning of the 14th century) can hardly be quite correct. In any case it is probable that we have here a slightly altered copy or translation of the normal-portolano in its original form. — Belonged in 1882 to Professor Tammar Luxoro in Genoa.

14th century (beginning). **Marino Sanudo the elder** (Marinus Sanutus dictus Torcellus). An atlas consisting of four to ten maps, is added to his *Liber secretorum fidelium crucis super Terrae sanctae recuperatione et conservatione*, of which many copies are known, written during the years 1306—1321 in order to incite the powers of Christendom to a new crusade. The work was printed, together with four of these maps, in BONGARS' *Gesta Dei per Francos*, Hanoviae 1611. According to KRETSCHMER, *op. cit.*, the different, for the most part very carefully prepared MSS. that are extant, contain ten maps, viz:

I—V. Charts of the Black Sea, the Mediterranean, and the west coast of Europe. Of these the chart of the East Mediterranean is reproduced on pl. VII from the original in the Riccardian library (0.44 × 0.35 m.); and the chart of the Black Sea, in fig. 13, according to KRETSCHMER's work, where the loxodromenet was omitted for the sake of clearness.

VI. A map of the world, considerably different in different MSS., often reproduced, first by BONGARS. His reproduction is repeated in my Facsimile-atlas, fig. 28. Here is given (fig. 20) a representation of the same map after SANTAREM's reproduction of the map in the Sanudo-manuscript that is kept in the Bibliothèque nationale in Paris.

VII. Map of Palestine, here reproduced on pl. VII from the original in the Riccardian library (0.49 × 0.195 m.).

VIII—X. Plans of the cities of Jerusalem, Ptolemais, and Antioch.

Of these maps, I—V form a normal-portolano, which both in its style of drawing and in its legends completely corresponds not only with Petrus Vesconte's maps, as Kretschmer has correctly pointed out, but with all portolanos of the normal type from the 14th—17th centuries. Likewise the maps of the world in the Vatican library, as shown by a comparison of fig. 6

¹ This list is by no means complete. Especially, many important maps from the countries north of the Alps are not mentioned. Moreover want of space has forced me generally to include only those among anonymous and undated portolanos that are specially referred to in this work. The list is based essentially on the above-quoted work by UZIELLI and AMAT, see p. 22, which is referred to by the abbreviation U.-A. Such charts, related to the original portolanos, as chiefly deal with the New World, will not be quoted till a subsequent chapter.

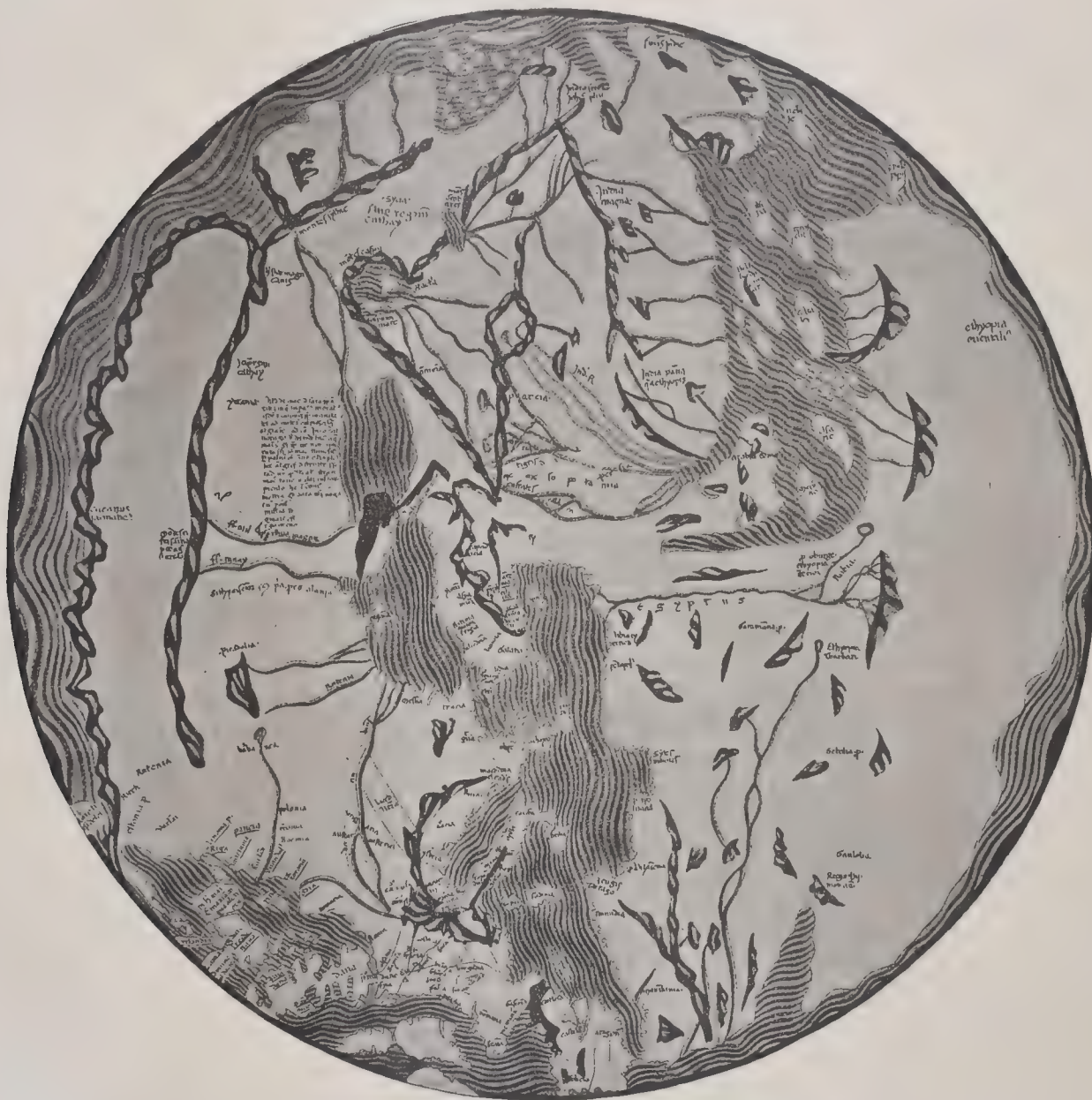
² The dimensions are here generally given according to Uzielli-Amat's work, in which, however, detailed statements of the point, on the map, between which the measurements were made, are not given. As regards the maps here reproduced according to the originals, some times a tape-measure divided into centimetres has been attached to the edge of the map when photographed, and thus the reproduction itself contains a measure of the size of the original.

with fig. 20. That Marino Sanudo constructed his portolanos himself is, apart from their resemblance to Vesconte's maps, little likely. But, until Barents and Crescentio published their works of the Mediterranean, he was the only scholar that affixed to his writings such maps as we now call portolanos. He is the only author, manufacturer, or publisher of portolanos with whose person and state of life we have any near acquaintance. Sanudo's map of Palestine is the first known non-ptolemaic map of a definite territory. It is not traversed by a loxodrome-net, but divided into small squares by parallel lines drawn from north to south and from east to west. That these lines were intended for the copying of the map, is proved by traces of such lines being discernible also on Sanudo's map of the East Mediterranean. This division seems to correspond to the division into squares on

For the older literature relating to this the reader is referred to U.-A., II, p. 51. Further contributions to the knowledge of Sanudo's work have been made by H. SIMONSFELD (*Studien zu Marino Sanuto dem Aelteren in Neues Archiv der Gesellsch. für ältere deutsche Geschichtskunde*, VII, pp. 43 et seq. Hannover 1881) and by KONRAD KRETSCHMER, *op. cit.*

1311—1321. Petrus Vesconte of Genoa.

1) 1311. Part of a normal-portolano, including the Black Sea and the east part of the Mediterranean (0.52 X 0.41 m.). The map of the west part of the Mediterranean, which evidently formed a second sheet of the portolano, is lost. Reproduced by ONGANIA (II), and here, on pl. V, from the original. Described by TH. FISCHER, *op. cit.*, pp. 111 et seq. Signed: "Petrus Vesconte de Janua fecit ista carta ann[o] dni MCCCXI." — Florence, Archivio di Stato.



20. MARINO SANUDO: Map of the World from the beginning of the 14th century. From Santarem. (Diameter of the original 0.324 m.)

the chart that an Arabian pilot showed Vasco da Gama in Melinde on the east coast of Africa (*vide antea* p. 15). The text of Sanudo's work contains a fairly detailed account of the trade and navigation of Europe at the beginning of the 14th century.

Sanudo's or Sanudo-Vesconte's map of the world forms to a certain extent an independent work, standing far above older mediæval maps of the world. It is based on Ptolemy, on the normal-portolano, and on information that Sanudo himself seems to have acquired during his long journeys. According to the copy in Bongars, Sanudo's map of the world is the first on which the Scandinavian peninsula and the Baltic with the islands of Gotland and Ösel are marked.

A. E. N. II.

2) 1318. Atlas, consisting of 10 plates (0.195 X 0.185 m.), of which JOMARD reproduced 9. As the reproduction here given on pl. VI shows, these 9 plates form a carefully executed normal-portolano without non-geographical illustrations in the interior of the continents. — Vienna, K. K. Bibliothek.

3) 1318. Atlas, consisting of 7 plates, namely, one astronomical diagram and 6 geographical maps, forming a normal-portolano (0.25 X 0.15 m.). No illustrations in the interior of the continents. Reproduced by ONGANIA (IV). — Venice, Museo civico.

4) 1320. Atlas, consisting of a round map of the world (N. fig. 6), 6 charts, a map of Palestine, plans of the cities

of Jerusalem and Ptolemais, and a synchronistic table. Corresponds entirely with the maps in Marino Sanudo. Discovered by KRETSCHMER, who described it in the above-quoted work. — Rome, Vatican Library.

5) 1321. A portolan by Vesconte of this year is mentioned by SANTAREM in *Essai sur l'hist. de la cosmographie*, I, Paris 1849, p. 272, but without the information where this portolano is kept. In *Bull. de la Soc. de géogr.*, 3:e série, VII, Paris 1847, p. 295 the same author says that it was drawn on several sheets for the doge of Venice.

1327. Perrinus Vesconte. Normal-portolano, drawn on a parchment sheet (0.945 X 0.58 m.) signed: "Perrinus Vesconte fecit istam cartam anno dni MCCCXXVII in Veneciis." Here reproduced on pl. VII, from the original. "Perrinus" is probably only a variation of the name "Petrus", and the chart a work by Petrus Vesconte. U.-A., II, p. 54. — Florence, Bibl. Laurenziana.

1339. Angelino Dulcert. A Catalan portolano (1.04 X 0.75 m.), as shown by the reproduction here given on pls. VIII and IX, provided with many geographical details in the interior of the countries, far finer and better rendered in geographical respect than the corresponding drawings on Andrea Bianco's maps from the first half of the 15th century. Signed: "Hoc opus fecit angelino Dulcert ano MCCCXXXVIII de mense augusti in ciuitate maioricarum." Further details about this chart are given in the following articles by E. T. HAMY: *La mappemonde d'Angelino Dulcert* (*Bull. de géogr. histor. et descript.* 1886, Paris 1887) and *Les origines de la cartographie de l'Europe septentrionale* (*ibid.* 1888.). Compare also, in reference to the Catalan portolanos, *Cresques lo Juheu, note sur un géographe juif catalan de la fin du XIV^eme siècle* (*ibid.* 1891). In Dulcert, the Baltic has the same extension as on Carignano's map, but there is a much larger number of legends, mostly easy to identify with places actually existing in the North, e. g. Stocol, Lunde, Bergis. The map of the North is reproduced in my Facsimile-atlas (fig. 26), as well as a number of legends on the map of the Mediterranean (p. 47). On Dulcert's portolano a star is drawn to the south of the Caspian Sea. A similar star, accompanied by three horse-men, is to be found in the Atlas Catalan, on Andrea Bianco's map of 1436, and on an anonymous Catalan planisphere of the 15th century (see the following page), as well as on Stefano Borgia's map of the world engraved on copper and dating from the first half of the 15th century. On the last mentioned map however the three wise men of the East walk on foot. — Belongs to Mr. Lésoüé of Paris.

1351. Anonymous atlas, generally quoted under the name of **Atlante Mediceo** or **Portolano Laurenziano-Gaddiano** (0.56 X 0.42 m.). It consists of the following 8 plates.

I. An astronomical diagram. The year 1351 is here used twice as starting-point for the calendar, whence it may be concluded that this was the year when the map was made.

II. A map of the world (N. fig. 8) specially remarkable for its drawing of the North and of Africa. Only a narrow sound separates Scotland from Norway, making the North Sea almost an enclosed sea. Africa is here for the first time drawn almost in triangle shape with its apex to the south. On the old maps of the type of Macrobius (see my Facsimile Atlas, pl. XXXI), Africa is also surrounded by water, but has a broad base to the south. Ptolemy makes Africa to the south of the Indian Ocean connected with Asia. On Edrisi's map of 1154 the southwest coast of Africa coincides with the limits of the "orbis terrarum". The same is the case on maps of the type reproduced in our fig. 2, and on the maps of the world by Vesconte, Sanudo, Andrea Bianco, and Fra Mauro.

III—VI form a normal-portolano, from which, however, part of the middle Mediterranean is missing. The map of

the east Mediterranean is here reproduced on pl. X, from the original.

VII. One of the ordinary special-charts of the Archipelago.

VIII. A map-sheet divided in two, on which special-charts of the Adriatic and the Caspian Sea are drawn under the same loxodrome-net. Here reproduced on pl. X, from the original.

In the interior of the continents there are various details drawn in the same style as in Petrus Vesconte. For the extensive literature to which this atlas has given rise, the reader is referred to TH. FISCHER, *op. cit.* pp. 127 et seq. Here, however, it may be noticed, that the Medicean portolano, except possibly for the map-drawing of the North, the Caspian Sea, and Africa, is by no means an original work. The remaining part of the map forms, as regards coast-outlines and coast-legends, a typical portolano. In the interior of the countries, on some of the map-sheets of this atlas, the rivers are far better drawn than on several maps of the 15th century, but will by no means stand comparison with those on Ptolemy's maps published a thousand years earlier. Reproduced by ONGANIA (V). U.-A., II, p. 55. — Florence, Bibl. Laurenziana.

1367—1373. Franciscus Pizigano of Venice.

1) 1367. Large chart (1.34 X 0.90 m.), comprising besides those countries that are generally drawn on the typical portolanos, also the southern part of the Scandinavian peninsula, the Baltic, and the Caspian. Also in the interior of the countries are numerous legends, as well as somewhat arbitrarily placed mountains and cities. Completely reproduced by JOMARD. According to the following inscription, besides Franciscus, Marcus(?) Pizigano collaborated in the preparation of the map: "MCCCLXXVII. Hoc opus compoxuid franciscus pizigano veneciā et domnus pizigano In Venexia meffecit marcus die XII decembris." (U.-A., II, p. 57.) The question of the relative ages of this map and of Fra Mauro's planisphere gave rise to a polemic at the beginning of this century; an account of it is given in *L'antichità del mappamondo dei Pizigani . . . vendicata. Lettere due di ANGELO PEZZANA*, Parma 1807. — Parma, Bibl. nazionale.

2) 1373. Normal-portolano, drawn on 5 sheets (0.25 X 0.15 m.). On the sheet that contains the Black Sea, is to be read: "MCCCLXXIII adie VIII de zugno Francischo pizigany venician in Venexia me fecit." As is often the case with portolanos bound in book-form, there are four other sheets (of a later period?) bound up with the main map, viz., two special-charts, the one of the Adriatic, the other of the Archipelago (N. figg. 11 and 12), and two astronomical diagrams (N. figg. 17 and 19), the one with drawings of the Campanile and the Church of St. Mark at Venice, and of the lighthouse and cathedral at Genoa. On account of their style, FISCHER (*op. cit.*, p. 150) considers that these sheets were possibly drawn by Johannes Xenodochos of Corfu, one of whose maps of similar appearance, dated 1520, is kept in the Museo civico at Venice. This, however, is little likely. It is perfectly impossible to decide the age of portolanos by their style, for even the hand-writing is slavishly copied; and the broad round hand, which here probably attracted the attention of Fischer, is peculiar to a great number of special-charts of the Adriatic and the Archipelago of the 15th century. Reproduced by ONGANIA (VI). U.-A., II, p. 58. — Milan, Bibl. Ambrosiana.

1375. Atlas Catalan. Portolan-atlas, consisting of six plates drawn on parchment (0.62 X 0.49 m.), attached in the middle to wooden boards, and bound in book-form. Has belonged to the library of the French king Charles V, in the catalogue of which it is inserted under the heading: "Une quarte de mer en tableaux faicte par manière de unes tables, peinte et historiée, figurée et escripte, et fermant à

quatre fermouers de cuivre." Minutely described by BUCHON and TASTU *op. cit.* Recently carefully reproduced by heliogravure in *Choix de documents* etc. (see above p. 25). The first two plates contain astronomical and astrological diagrams and voluminous legends of cosmographic, cosmogonic, and geographical contents. On the other four there are maps, which are here (pls. XI—XIV) reproduced from the above-mentioned heliogravures on a somewhat smaller scale. The coast-legends are here quoted pp. 25 *et seq.* The Atlas Catalan forms the most comprehensive cartographic work of the 14th century. It is particularly rich in 'historico-geographical mythical legends in the interior of the countries. A normal-portolano served as basis for the drawing of the map along the coasts of the Black Sea and the Mediterranean as well as of the neighbouring parts of the Atlantic Ocean. The map affords a good opportunity for comparing the finish of the normal-portolano, the skipper-map based only on practical observations, with the coarseness of geographical representations of the interior of countries by the learned during the incunabula-period of cartography. — Paris, Bibl. nationale.

1380(?)—1385. Guglielmo Soleri of Majorca.

1) About 1380. Normal-portolano (1.04 × 0.65 m.) signed "Guillmo Soleri ciuis Maioricarū me fecit". Reproduced by G. MARCEL in *Recueil de portulans*, Paris [1886]. Compare also *Catalogue des documents géogr.* etc., Paris 1892, p. 4. — Paris, Bibl. nationale.

2) 1385. Normal-portolano drawn on a whole skin (1.00 × 0.62 m.). On the north side of the map is to be read: "Guillmus solerii ciuis Maioricarū me fecit Anō Nativitatis dñi MCCCCLXXXV." Here reproduced on pl. XVIII, from the original. Fairly minutely described by HOMMAIRE DE HELL in *Bull. de la Soc. de géogr.*, 3:e série, VII, Paris 1847, p. 302. — Florence, Archivio di Stato.

1384. Pinelli-Walckenaer atlas. Contains a lunar calendar and 6 map-sheets (0.30 × 0.23 m.). The atlas, which probably is a Genoese work, belonged to the Pinelli-family of Venice, and at the sale of their library in London, in 1790, it was purchased by Baron Walckenaer of Paris (D'AVEZAC: *Fragment d'une notice sur un atlas manuscrit de la bibliothèque Walckenaer. Bull. de la Soc. de géogr.*, 3:e série, VIII, Paris, 1847, pp. 142 *et seq.*). Reproduced in colours by SANTAREM. Map-sheet I is divided into two parts, one of which consists of a calendar, the other of a portolan-card of the west coasts of Europe and Africa on both sides of the Straits of Gibraltar. Sheets II—IV consist of the ordinary normal-portolano of the Mediterranean and Black Sea, and sheets V and VI of special-charts of the Adriatic and the Archipelago. The calendar on map-sheet I includes the years 1384—1434, from which it may be concluded that the map was executed in the first-mentioned year. The map-sheets are here reproduced on pls. XV—XVII, after Santarem. As to the calendars, see above, pp. 51 *et seq.*

Among undated portolanos of the 14th and 15th centuries there is further a splendid typical portolano quoted by U.-A., as preserved in the Archives at Lucerne; it has been reproduced in gold and colours in SANTAREM's atlas. The map is, however, as the wind-roses show, evidently a work of the 16th century.

TH. FISCHER (*op. cit.*, p. 220) also refers the Arabic map in the Ambrosian Library to the end of the 14th century. This, however, is certainly of later date (compare above, pp. 46, 47).

Portolanos of the 15th century.

15th century (first half). Combitis' portolano. Anonymous portolano, consisting of 4 plates without drawings in the interior (0.38 × 0.30 m.). On one of them is to be read:

"Haec tabula ex testamento domini Nicolai de Combitis devenit in Monasterio Cartusiae florentinae." Reproduced by ONGANIA (VII). U.-A., II, p. 60; TH. FISCHER, *op. cit.*, p. 151; P. MATKOVIĆ (*Mittheilungen der K. K. geogr. Gesellsch.*, VI, p. 83, Wien 1862) points out that this map resembles Vesconte's portolano of 1318; the statement is correct in so far as both are copies of the normal-portolano, but the small compass-rose that is here drawn in the middle of each map, suggests that Combitis' portolano dates not from the beginning, but from the close of the 14th century, or rather from the first part of the 15th (compare above, pp. 47, 48). — Venice, Bibl. Marciana.

15th century (first half). The Upsala-portolano. Anonymous, typical normal-portolano (1.07 × 0.65 m.), here reproduced on pl. XIX. — Upsala, University-library.

15th century (first half). Anonymous portolano (0.75 × 0.25 m.) Reproduced by ONGANIA (XII). U.-A., II, p. 70. — Mantua, Museo comunale.

15th century (first half). Cristoforo Buondelmonte (Ensenius). He travelled in the Orient at the beginning of the 15th century in order to look for old MSS. On his return he wrote a description of the islands of the Aegean, of which there are many MSS. extant (U.-A., II, pp. 63, 295), often accompanied by maps, which form the prototype of the maps in *Isolario di BARTOLOMEO DA LI SONETTI* (Venezia circa 1477) and in BORDONE's *Isolario*, the first edition of which was published in Venice in 1528. Besides these maps, of small importance from geographical point of view, a Buondelmonte-codex at Florence, entitled *Descriptio Cycladum aliarumque insularum*, contains a particularly important map of the North, of the same type as the one that I found at Warsaw. Reproduced in *Bidrag till Nordens äldsta kartografi, vid fyrahundraårsfesten till minne af nya världens upptäckt utgifven af Svenska sällskapet för antropologi och geografi*, Stockholm 1892, also here on pl. XXXII. This map is ruled with lines of longitude as well as of latitude, and is one of the first graduated non-ptolemaic maps; for I presume that the original is of the close of the 14th century or the beginning of the 15th. In a following chapter, which discusses the extension of the normal-portolano towards the north and north-west, I shall return to this map, one of the most important in the libraries and archives of Florence, rich though they are in cartographical treasures. In the same codex there are also maps of England, Scotland, and Ireland, deviating from Ptolemy's *Britannia* as well as from the portolan-maps of these countries. Reproductions of them are given on pl. XXXIII.

15th century. Catalan planisphere, including the whole of Europe, West Asia and North Africa. Richly coloured and furnished with figures, flags, coats-of-arms, etc. in the same style as on the Catalan map of the world of 1375. Reproduced by ONGANIA (XIII). Compare also fig. 9 above, where some of the outline-drawings are taken from this map. U.-A., II, p. 230; TH. FISCHER, *op. cit.*, pp. 213 *et seq.* — Florence, Bibl. nazionale.

15th century(?). Petrus Rubeus of Messina. Chart, probably normal-portolano. U.-A., II, p. 280. — Belonged in 1882 to Count Giuliano Merenda at Forlì.

1408. Nicolò Pasqualini. Portolano. U.-A., II, pp. 61, 295. — Vienna, K. K. Bibl.

1413—1457(?). Mecia de Viladestes.

1) 1413. Catalan portolano with numerous flags and figures. Signed: "Mecia de Viladestes me fecit in ano 1413." As on Atlas Catalan, there occurs here a legend about J. FERER's voyage to Rio d'Oro in 1346. CORTAMBERT: *Introduction à l'Atlas des monuments de la géogr. par feu M. Fomard* (*Bull. de la Soc. de géogr.*, 6:e série, XVIII, Paris 1879, p. 74). *Notice des objets exposés dans la section de géogr.*, Paris 1889, p. 14. — Paris, Bibl. nationale.

2) 1457. A portolano of this date, with the same legends concerning Ferer's voyage, is mentioned by BUCHON and TASTU (*op. cit.*, p. 67, foot-note) as to be found in the Chartreuse-monastery at Segorbe (prov. Valencia in Spain). May it not be identical with the preceding? According to R. H. MAJOR (*Life of Prince Henry ... the Navigator*, London 1868, p. 54) the map of 1413 was once to be found at Segorbe.

1421. Franciscus de Cesanis of Venice. A parchment-sheet, including the Mediterranean (0.95×0.57 m.). Many standards with the arms of the different states. MATKOVIC, *op. cit.*, p. 104; U.-A., II, p. 63. — Venice, Museo civico.

1422—1446. Jacobus Giroladis of Venice.

1) 1422. Portolano of the Mediterranean, with inscription: "1422 mensse junii die primo Jachobus de Giroladis Veneciis me fecit." (*Notice des objets exposés* etc., p. 14.) — Paris, Bibl. nationale.

2) 1426. Portolan-atlas carefully executed (0.36×0.27 m.). The normal-portolano comprises 5 sheets, to which is added a special-chart of the Adriatic, thus 6 map-sheets in all. In the interior of the continents the rivers are marked in a manner that reminds one of Arabic maps. The same style, bearing witness to a remarkable want of taste for geographical drawings is also found on the maps prepared by Andrea Bianco. A distance-scale divided into portolan-miles forms the east and west margin of some of the maps by Giroladis. This distance-scale must not be confounded with latitude-degrees. According to FISCHER (*op. cit.*, p. 153) on one of the maps of this atlas can be read: "Jachobus de Ziraldis (or Ziroladis) de Veneciis me fecit anno domini MCCCCXXVI." The coast-legends are here introduced on pp. 25 *et seq.* Reproduced by ONGANIA (VIII). — Venice, Bibl. Marciana.

3) 1443. Portolan-atlas, consisting of 6 maps (0.36×0.30 m.). — Florence, Bibl. Ambrosiana.

4) 1446. Portolan-atlas, also consisting of 6 maps, folded in two for binding (0.38×0.31 m.). — Florence, Società Colombaria.

5) Anonymous portolano, which FISCHER considers to be by the same portolan-manufacturer. — Florence, Bibl. Ambrosiana.

It is remarkable that while this map-draughtsman copied the legends of the old normal-portolano with the utmost exactitude and with a praiseworthy correctness, the manner of signing his own name is different on almost every map: *Giroladis, Ziraldis, Zeroldis, Ziredis*. Compare TH. FISCHER, *op. cit.*, p. 153; U.-A., II, pp. 64 and 68.

1426—1435. Battista Becharius of Genoa.

1) 1426. Chart of the Mediterranean and the west-coast of Europe (0.87×0.68 m.). KUNSTMANN: *Die Entdeckung Amerikas*, München 1859, pp. 10, 85. The name of the map-author has been read by Kunstmann as: *Ircharius*. U.-A., II, p. 64. — Munich, Royal Museum.

2) 1435. Portolano, chiefly comprising Europe from the Baltic to the Mediterranean (0.98×0.65 m.), signed: "Becharius, Civis Ianue, composuit hanc [cartam] anno domini millexio CCCCXXXV de Julii." (U.-A., p. 65.) — Parma, Bibl. reale.

1427. Claudius Clavus. A small map of the North (0.220×0.155 m.), which, besides a table of latitude and longitude, is added to a Ptolemy-MS., preserved in the town-library at Nancy. For the literature concerning this map the reader is referred to p. 54 of my Facsimile-atlas, in which work it is reproduced as fig. 27. A reproduction in colours of both map and text is moreover introduced in A. E. NORDENSKIÖLD: *Studier och forskningar, föranledda af mina resor i höga Norden*, Stockholm 1883. Subsequently G. STORM has critically treated the same remarkable geographical document: *Den Danske Geograf Claudius Clavus eller Nicolaus Niger (Ymer)*, Stockholm 1889 and 1891. A copy on a very reduced scale is here given, fig. 36.

1430. Cholla de Briaticho. Normal-portolano, consisting of three maps (0.421×0.261 ; 0.410×0.259 and 0.414×0.263 m.), signed: "In 1430 cholla briaticho Ila ficet [sic]." Briaticho is a small town in Calabria. U.-A., p. 65. — Siena, Bibl. comunale.

1435—1482. Gratosus Benincasa of Ancona. The following works by this exceedingly prolific map-draughtsman or map-drawing firm are extant.

1) 1435—1445. Atlas, consisting of 62 maps, drawn on paper, including the coasts of the Adriatic, the Ionian, and Aegean Seas, together with the Sea of Marmora and the Mediterranean (0.28×0.20 m.). The maps belong to a MS., which contains also sailing-directions and rules for navigators. (U.-A., II, p. 66.) — Ancona, Archivio comunale.

2) 1461. Chart of the coasts from the Sea of Azof to the Atlantic (0.85×0.49 m.), signed: "Gratosus Benincasa anconitanus composuit in civitate Ianue in anno MCCCCXXI die XX decembris." U.-A., II, p. 76. — Florence, Archivio di Stato.

3) 1463. Atlas, consisting of 4 sheets, small folio. U.-A., II, p. 77. — Belonged to the library of Matteo Pinelli at Venice.

4) 1463. Atlas consisting of 5 sheets. — British Museum (*Catal. of additions to the Brit. Mus. manuscripts* 1848—53, no. 18 454).

5) 1465. Atlas, consisting of 5 sheets (0.42×0.34 m.) including the Mediterranean and the coast of the Atlantic from Cape Verde to Jutland. U.-A., II, p. 77. — Vicenza, Museo civico.

6) 1466. Chart of the Mediterranean, signed: "Gratosus Beninchasa Anconitanus composuit Veneciis anno Domini 1466." *Notice des objets exposés* etc., p. 14. LELEWEL, *op. cit.*, II, p. 104. — Paris, Bibl. nationale.

7) 1467. Chart, partly reproduced by SANTAREM. Signed: "Gratosus Benincasa anconitanus composuit Romae anno Domini 1467." LELEWEL, *op. cit.*, II, p. 104. — Paris, Bibl. nationale.

8) 1467. Atlas, consisting of 5 plates, comprising the territory of the normal-portolano. — London, British Museum (*Catal. of the manuscript maps* etc., I, London 1844, p. 16).

9) 1468. Atlas consisting of 7 sheets. According to the usual detailed signature of Benincasa, drawn at Venice. U.-A., II, p. 78. — Palermo, library of Prince Lanza di Trabia.

10) 1468. Atlas, consisting of 8 sheets (0.343×0.273 m.), signed: "Gratosus de Benincasa, Anconitanus, magnifico viro Prospero Camulio, Medico Genuensi, fecit 1468." — London, Brit. Museum (*Catal. of the manuscript maps* etc., I, p. 16).

11) 1469. Portolan-atlas. U.-A., II, p. 79. — Once belonged to the collection of Mr. Montelay at Paris.

12) 1469. Seven charts (0.42×0.33 m.), comprising the Black Sea and the Mediterranean, as well as some of the coasts of Europe and Africa on the Atlantic. U.-A., II, p. 79. — Milan, Bibl. Ambrosiana.

13) 1469. Another atlas by Benincasa, dated this year and consisting of 6 sheets, is now preserved in the British Museum (*Catal. of additions* etc. 1876—81, no. 31 315).

14) 1470. Chart. U.-A., II, p. 80. — Was once to be found in the Bibl. dei Chierici Regolari somaschi della salute at Venice. Perhaps the same as is mentioned in *Catal. of additions* etc. 1876—81, no. 31 318.

15) 1471. Portolan-atlas. U.-A., II, p. 80. — Rome, Bibl. Vaticana.

16) 1471. Chart. Reproduced by SANTAREM. This map, according to FORMALEONI (*op. cit.*, pp. 41, 42), is graduated, but the graduation seems to be a later addition. U.-A., II, p. 80. — Murano, Bibl. di S. Michele.

17) 1473. Chart, drawn in Venice. U.-A., II, p. 81. — Bologna, University library.

18) 1476. Chart of the Adriatic and Ionian Seas, the Archipelago and the Sea of Marmora. U.-A., II, p. 81. — Ancona, Archivio comunale.

19) 1480. Atlas consisting of 12 maps. LEBWEL, *op. cit.*, II, p. 104; U.-A., II, p. 81. — Vienna, K. K. Bibl.

20) 1482. Chart. U.-A., II, p. 279. — Bologna, University library.

21—25) Five undated charts quoted by U.-A. under nos. 72—76, comprising parts of the Mediterranean and the Black Sea. — London, British Museum.

Africa. First minutely described and partly reproduced by FORMALEONI on pp. 100—108 of his above-quoted work. Subsequently several of the maps in Bianco's atlas have been reproduced by SANTAREM, and as photographs by MAX MÜNSTER and ONGANIA (IX). They have also formed the subject of an extensive literature, which is referred to by U.-A., II, p. 68. PESCHEL in his introduction, written in 1869, to Max Münster's reproduction of this atlas, says that it forms a link between »Compass-karten» and graduated maps. This is incorrect in two respects. The graduation in Andrea Bianco's



21. Planisphere by JOHANNES LEARDUS 1448. From Santarem. (Diam. of circle in original 0.29 m.)

1436—1448. Andrea Bianco.

1) 1436. Atlas, consisting of 10 maps (0.38 × 0.25 m.), among which are a graduated map of the world, copied from Ptolemy, and a circular map of the world (N. fig. 7), somewhat like that by Vesconte. The rest form a typical portolano (N. T. XX, XXI), with drawings in the interior of the continents, and with some valuable appendices referring to the representation of the Baltic and the north-west coast of

A. E. N. II.

atlas of 1436 is, except for the map copied from Ptolemy, only apparent; and long before the 15th century there were copies of Ptolemy's atlas, where all maps were graduated, and that with scientific correctness. The first graduated non-Ptolemaic maps are the map of the North that is in the above-mentioned codex by Buondelmonte, and Claudius Clavus' map of the North in the Ptolemy-codex preserved in the library at Nancy. — Venice, Bibl. Marciana.

2) 1448. Chart, drawn on a parchment-sheet (0.85×0.63 m.) and only comprising the Atlantic coasts of England, France, Spain, and of the North of Africa. On the south part of the chart is the following legend: "Andrea Bianco venician comito di galia mi fexe a Londra MCCCCXXXVIII." It is supposed that this chart was intended to illustrate the discoveries of the Portuguese along the west coast of Africa. Reproduced by ONGANIA (XI), TH. FISCHER, *op. cit.* pp. 207 *et. seq.*; U.-A., p. 72. The inscription customary on portolanos, gives information about Bianco's social position and evidence of his ignorance both of Latin and of the Italian written language. This portolano moreover, is, so far as I know, the only one of the 14th or 15th century, of which it is expressly stated that it was drawn in a place not situated on the coast of the Mediterranean, and it is also perhaps the first chart drawn in England. — Milan, Bibl. Ambrosiana.

1439—1447. Gabriele de Vallesecha of the Balearic Isles.

1) 1439. A portolano drawn on a whole skin, profusely adorned with miniatures. On the back is to be read: "Questa ampla pelle di geographia fù pagata da Amerigo Vespucci CXXX ducati di oro di marco." This elaborate work belonged in 1838 to the private library of Count Montenegro at Palma. During a visit from George Sand the chart had the sad misfortune to get badly injured with ink (GEORGE SAND: *Un hiver à Majorque*, Paris, Lévy 1869, p. 63).

2) 1447. Catalan chart, comprising the Mediterranean and the Black Sea. U.-A., II, p. 231. — Belonged in 1882 to Nob. D. N. Barozzi at Venice.

1447. Anonymous planisphere of elliptic or spool shape (larger axis = 0.82 , smaller = 0.455 m.). This exceedingly interesting map of the world is, as the measurements previously given show, grouped around a typical portolano of the Mediterranean and the Black Sea. On the left side of the map is to be read (according to FISCHER) "Hec est vera cosmographorum cum marino accordata terra, quorundam frivolis narrationibus rejectis 1447." Reproduced by ONGANIA (X). The map has been monographed by J. LELEWEL under the heading *Descriptio Cosmographorum cum Marino accordata in Géographie du moyen âge. Épilogue*, pp. 167—184, Bruxelles 1857. For the literature of this map further reference may be made to U.-A., II, p. 62 (who read the date as 1417) and to TH. FISCHER, *op. cit.* p. 155. *Cum marino* in the above quoted legend has been interpreted as a reference to the Tyrian geographer. Here it should be remembered that the only part of this map of the world that is at all correct from a cartographical point of view, consists of the Mediterranean and the Black Sea, and here the normal-portolano has served as a pattern, or rather been carefully copied, and not Ptolemy, as some authors have supposed. Even the distance-scale of the normal-portolano was used on the map. The inscription thus denotes that here is presented a picture of the world, according to the conception of the learned cosmographers, adapted to, or grouped round, a skipper-chart of the inner sea. Probably *cum marino* ought not to be interpreted in any other way, tempting though it might be to suppose that this "skipper-map", the normal-portolano, was here designated by the name of the Tyrian geographer. — Florence, Bibl. nazionale.

1448—1452. Johannes Leardus of Venice.

1) 1448. Planisphere (the diameter of the circle 0.29 m.). Reproduced by SANTAREM, and here in fig. 21. U.-A., II, p. 72. — Vicenza, Museo civico.

2) 1452. Planisphere of the known world (0.63×0.60 m.; diameter of the circle 0.405 m.), signed: "Johannes Leardus me fecit ab anno 1452." Jerusalem is taken as the centre of the representation of the world. The Mediterranean and Black Sea are carefully drawn from the normal-portolano. Reproduced by ONGANIA (XIV) with a *Nota il-*

lustrativa di GUGLIELMO BERCHET, *letta al R. Istituto veneto di scienze, lettere ed arti il 25 Ap. 1880*, Venezia. U.-A., II, p. 73. — Belonged in 1882 to the Consul-General F. de Pillet in Venice.

15th century (latter half). **Map of Scandinavia**, Iceland, and Greenland, on Donis' projection (0.565×0.355 m.). Reproduced in my Facsimile-atlas, pl. XXX. Inserted in a Ptolemy-codex in the Zamoiski library at Warsaw.

15th century (latter half). Map of the same type as the preceding, in a Ptolemy-codex in the Laurentian Library at Florence. Reproduced in *Bidrag till Nordens äldsta kartografi*, Stockholm 1892.

15th century (latter half). Map of the same type as the two preceding but on the equidistant projection of Marinus, in a Ptolemy MS. in Bibl. nazionale at Florence. Reproduced in *op. cit.*

15th century (latter half). **Map of the North**, accompanying a Ptolemy-codex in Bibl. royale at Brussels. This map belongs to a type which subsequently was published among *Tabulae modernae* in Ptolemy's Geography, editions 1482, 1486, 1507, 1508, 1513, and others. It probably originated from a map of the same type as the map of the North in the Ptolemy editions in the Zamoiski library, and in the Laurentian and National libraries at Florence, as well as in the above-mentioned codex of Buondelmonte, both with this difference that a learned map-draughtsman tried to correct the position of Greenland with the aid of compass bearings, but without knowledge of the considerable deviation of the compass in Greenland waters.

I shall subsequently return to these maps, which may be considered as links between Ptolemy's maps and the portolanos. They have during a long time exercised a very great influence on the cartography of the Scandinavian countries, and also served as the base of the Zeno-map printed by Marcolini at Venice in 1558.

1455. Bartolomeus Pareto. Planisphere of the known world (1.48×0.70 m.), signed: "Presbiter Bartolomeus de pareto civis Ianue Acolitus Sanctissimi Domini nostri pape composuit hanc Cartam MCCCCLV in Ianua." U.-A., II, p. 73. — Rome, Bibl. Vittorio Emanuele.

1459. Antonio Pelegan e Miraro. Chart of the coasts of Dalmatia. (U.-A., II, p. 75). — Belonged in 1882 to Dr. Nardo of Venice.

1459. Fra Mauro Camaldolese. Large, celebrated planisphere or circular map of the world (diam. 1.96 m.). Is considered one of the most important cartographical works of the 15th century. It early attracted great attention and has been copied several times: for Alfonso V of Portugal (died 1481), for one of the palaces of Florence at the end of the last, and for the British Museum at the beginning of this century. Subsequently the map was monographed and copied on a very diminished scale by Cardinal PLACIDO ZURLA, in his important work *Il mappamondo di fra Mauro Camaldolese*, Venice 1806; also in WILLIAM VINCENT: *The commerce and navigation of the ancients in the Indian Ocean*, II, London 1807, pp. 661 *et seq.* It has been reproduced by lithography, in natural size, by SANTAREM, and finally by photography, on a scale reduced to something less than one-half, by ONGANIA (XV). For the outer frame of his map Fra Mauro has taken a circle, the centre of which is situated a little north of Babylon. The middle of the west part of the map is occupied by a typical portolano of the Mediterranean and Black Sea. This part of the planisphere is also the only part that is approximately correct at least in cartographical respects. But the great importance of Fra Mauro's atlas does not depend on any cartographical perfection, but on its minute though fantastical drawings of all known countries of the Old World and on the no less fantastical legends accompanying them, the whole forming a

mediaeval cosmography of no small extent. From this we obtain a clear conception of the geographical ideas and prejudices of the learned world during the first decades of the century of great geographical discovery. A remarkable progress is moreover shown by Fra Mauro's planisphere as regards the drawing of Scandinavia and Africa. In Africa numerous tribes and cities are marked even beyond the equator, in regions generally designated as *inhabitabiles propter nimium calorem*. — Venice, Bibl. Marciana.

1463—1464(?). Petrus Roselli of Majorca.

1) 1463. Chart in large folio, signed: "Petrus Roselli composuit hanc cartam in civitate Maioricarum anno Domini 1463." *Notice des objets exposés* etc. p. 14. — Paris, Bibl. nationale.

2) 1464(?) Chart that belonged to the library of Siegfried Moerl at Nuremberg and is quoted by LELEWEL (*op. cit.*, II, p. 108).

3, 4). By Roselli we have further two undated charts, which together form a typical portolano. U.-A., II, pp. 82, 83. — London, British Museum.

1470. Nicolaus de Nicolo. Chart. U.-A., II, p. 279. — Belonged in 1882 to Count Pietro Gradenigo at Venice.

1476—1508. Andreas Benincasa of Ancona.

1) 1476. Atlas consisting of 5 maps. Signed: "Andreas Benincasa, f[ilius] Gratosi Ancōitan composuit Añō dñi MCCCCLXXVI." LELEWEL, *op. cit.*, II, p. 105. — Geneva, Bibl. municipale.

2) 1490. Chart of Europe, Asia Minor, and North Africa (0.85 × 0.50 m.). This chart is thus spoken of by U.-A., II, p. 92: "Carta nautica impressa(!) su pergamena manoscritta, credesi originale." The chart thus seems to be partly printed, partly hand-drawn. (Cf. p. 72 *infra*.) — Ancona, Archivio comunale.

3) 1508. Chart (0.95 × 0.63 m.). (U.-A., II, p. 106.) — Rome, Museo Borgia.

1480(?)—1505. Jehu Debenzara of Alexandria.

1480(?). Chart. U.-A., II, p. 231. — Rome, Museo Borgia (cf. W. RUGE, *Zur Geschichte der Kartographie* in KETTLERS *Zeitschrift für wissenschaftliche Kartographie* 1891, p. 403).

1497. Chart of the Mediterranean and the coasts of the Ocean to Cape Bojador (1.05 × 0.70 m.) U.-A., II, p. 234 (cf. W. RUGE, *op. cit.* p. 402). — Rome, Museo Borgia.

1505. Chart of the Mediterranean, signed: "Jehu debenzara ha fata la presente in Jafet di Galilea en l'anno de ... dell' otubro MDV." U.-A., II, p. 238. — Belonged in 1882 to Luigi Treves at Venice.

About 1489. In the British Museum is preserved a portolan-atlas, containing 35 charts, one of which is dated 1489 (0.533 × 0.406 m.). It formerly belonged to the Cornaro family, subsequently to the St. Mark Library, and was described by Cardinal ZURLA in *Sulle antiche mappe idrogeografiche*, Venezia 1818, pp. 353—358. This precious atlas was brought to England by M. Vendramini and was purchased for the British Museum at the sale of the Rev. C. Yonge's library in 1832. Besides a number of anonymous charts, together with two charts by PETRUS ROSELLI and 4 charts by GRATIOSUS BENINCASA, which are referred to above, there are charts here by ZUAN DA NAPOLI (2 charts, together forming a typical portolano); 2 charts of the Black Sea by FRANCESCO BECARO; 3 copies of the normal-portolano by NICOLÒ FIORIN; a chart of the Adriatic and part of the Ionian sea by FRANCESCO CEXANO; a chart of the Adriatic with the Ionian Islands, the west coast of Italy, Sicily, and Corsica by ZUAN SOLIGO; 2 charts of the Black Sea and the Archipelago by ALVIKE CEXANO; one chart of the Archipelago, etc. by NICOLÒ DE PASQUALIN; another chart of the Archipelago etc., signed: "BENEDITUS PESINA fecit ano Domini MCCCCLXXXVIII, Veneciis;" 4 charts of the Mediterra-

nean and the west coast of Europe, probably by CEXANO; chart of the coasts of Spain and Portugal and the west coast of Africa to Cape Verde, by CRISTOFORO SOLIGO. There are besides in the same atlas eleven manuscript articles for the guidance of sailors. (*Catal. of the manuscript maps* etc. I, pp. 17 *et seq.*)

1491. Jacobus Bertran of Majorca. A Catalan portolano of the Mediterranean and the Black Sea drawn on a whole skin (1.03 × 0.67 m.). The legends partly translated into Arabic. U.-A., II, p. 233. — Florence, Archivio di Stato.

1494. Georgius Joannis (Giovanni Georgio) of Venice. Chart of the Black Sea, the Mediterranean, and the neighbouring parts of the Atlantic coast. U.-A., II, p. 93. — Parma, Bibl. reale.

Besides the cartographic works, here enumerated, there are further quoted in U.-A. more than twenty undated and anonymous portolanos of the 15th century, most of them preserved in Italian libraries.

The few charts that were *printed* during the 15th century, will be mentioned in a later chapter.

Portolanos of the 16th & 17th centuries.

Many may imagine that the majority of portolanos were drawn during the 14th & 15th centuries before the discovery of the art of reproducing maps by copper- or wood-engraving. But this is by no means the case. UZIELLI-AMAT's work, often quoted here, reckons about 130 portolanos of the 14th and 15th centuries, but nearly 300 of the 16th and 17th. Many of these, however, are only bad copies of older maps, executed uncritically and without any regard to the new geographical discoveries. For that reason they are also of little value for the history of geography or cartography. It is these maps that ANTOINE DU PINET in his *Plantz, pourtraitz et descriptions de plusieurs villes* etc., Lyon 1564, p. 3, calls "chartes que un tas de Dominotiers François et Italien vendent à milliers, ou n'y a que fausseté." There are, however, among them several works particularly well executed from an artistic, if not from a geographical, point of view. I shall here enumerate only the most interesting of them, those that already have been the subjects of monographs or that deserve attention through perfection of execution, through improvements on the normal-portolano itself, or through widening the territory of cartography by means of registering actual observations beyond the narrow limits of the normal-portolano.

To avoid unnecessary repetition I have from the following list excluded several maps, that chiefly deal with the New World, *e. g.* works by Juan de la Cosa, Cantino, Canerio, Ribero, Viegas, Desceliers, Desliens, Gutierrez, Le Testu, and Vāz Dourado. These documents will be enumerated in a following chapter dealing with the cartography of the New World.

16th century (first half?). Anonymous portolano on a whole skin in my collection (0.83 × 0.62 m.). In the interior of the continents, mountains and rivers are marked, as well as names of countries, while the map is also adorned with miniature-portraits of several sovereigns. Was originally carefully executed, but is at present considerably damaged. Reproduced here on pl. XXIII.

16th century (first half). Anonymous portolano, which belonged to Cardinal Richelieu. Reproduced by SANTAREM. As I have before mentioned (p. 55, note 1), Santarem incorrectly refers this map to the 14th century. — Paris, Bibl. nationale.

16th century. Lopo Homen. Typical portolano. U.-A., *Appendice*, Roma 1884, p. 48. — Belonged in 1884 to the Duke Scipione Salviati at Rome.

1497—1556. The Freducci family of Ancona.

a) Conte Freducci.

1) 1497. Typical portolano (0.93 X 0.70 m.), signed: "Contes Hectomanni de Fredutiis de Ancona 1497." Reproduced in SANTAREM's atlas, and here on pl. XXII according to Santarem. — Wolfenbüttel, Ducal Library.

2) 15th century (the end). Typical portolano with miniatures of cities, sovereigns, etc. (0.56 X 0.48 m.). The signature is partly effaced (U.-A., II, p. 280). — Lucca, Bibl. pubblica.

3) About 1515. Chart of the Atlantic, also including part of the New World. Described and reproduced by E. CASANOVA: *La carta nautica di Conte di Ottomanni Freducci*, Firenze 1894. — Florence, Archivio di Stato.

4) 1524. Chart of the Black Sea together with the eastern and middle Mediterranean (0.65 X 0.38 m.). Signed: "... Conte de hoctomanno Freducci de Ancona la fatta nel 1524." — Belonged in 1882 to Marquis G. di Colloredo at Udine.

5) 1524(?). Portolano with the inscription half effaced. Is referred by U.-A. to Conte Freducci. Is mentioned by HUMBOLDT in *Kritische Untersuchungen*, Berlin 1852, I, p. 415, but with the date 1424. — Weimar, Ducal Library.

6) 1528. Atlas (5 sheets) of the territory of the normal portolano (0.43 X 0.33 m.). — The Hague, Royal Library.

7) 1528. Portolan-atlas, also consisting of 5 sheets. — London, British Museum.

8) 1533. Portolan-atlas, consisting of 5 charts (0.415 X 0.345 m.), signed: "Iehsus Maria Uirgo Conte de Hoctomanno Freducci de Ancona la facte in Ancona nelanno MCCCCXXXIII." Belonged in 1882 to Professor Corvisieri at Rome.

9) 1536. Portolan-atlas (4 charts), comprising the territory of the normal portolano. — Palermo, the library of Prince Lanza di Trabia.

10) 1537. Portolan-atlas (5 charts), signed: "Conte de Ottomanno Freducci de Ancona la facte 1537." — Belonged in 1882 to Luigi Arrigoni at Milan.

11) 1538. Portolan-atlas (5 charts). Cf. W. RUGE, *op. cit.*, p. 403. — Rome, Museo Borgia.

12, 13) 1538. Two portolanos in the British Museum (see *Catal. of the manuscript maps etc.*, I, London 1844, p. 23 and *Catal. of additions to the Brit. Mus. manuscripts* 1854—60, no. 22 348).

14) 1539. Portolan-atlas (5 sheets), signed: "Jhesus Maria Virgo Conte de Octomanno Freducci Anconitano la facte l'anno 1539." — Bologna, Bibl. municipale.

b) Angelus Eufredutius (Angelo Freducci).

1) 1556. Five map-sheets of Europe and Asia, drawn on paper at Ancona (0.45 X 0.35 m.). — Mantua, Bibl. governativa.

2) 1556. Typical portolano, drawn on parchment (0.925 X 0.535 m.). W. RUGE, *op. cit.*, p. 400. — Rome, Bibl. Casanatense.

According to U.-A. there were besides Angelus Eufredutius two map-draughtsmen with the name *Freducci*, namely *Conte* and *Ottomano*. The signatures seem, however, to correspond so completely, that I see hardly any reason for this supposition.*

1504—1586. The Maiolo or Maggiolo family.

a) Vesconte Maiolo came from Genoa, where in 1519 he became a *Magister cartarum pro navigando*, which probably is best regarded as the title of a Guild: *Master Map-draughtsman*.

1) 1504. Chart dated 1504, exhibited at the geographical congress at Venice in 1881 (*Catal. gen.*, II, no. 433). — Belonged then to Luigi Masetti of Bologna(?).

2) 1511. Atlas, consisting of 10 sheets (0.40 X 0.28 m.); on one of these there is a map in polar-projection of the

part of the world then known. It is the first portolano on which the discoveries in the new hemisphere were entered. Signed: "Vesconte de Maiolo ciuis Janue composuy in neapoly de anno 1511, die XX January." D'AVEZAC: *Atlas hydrographique de 1511 du Génois Vesconte de Maggiolo (Anales des voyages*, Paris 1870). — Belonged during the last century to the library of the Spaniard Altamira; has subsequently belonged to R. Heredia at Madrid (*Catal. de la bibl. de M. Ricardo Heredia*, III, Paris 1893, no. 2 848).

3) 1512 (10 March). Atlas. — Parma, Bibl. nazionale.

4) 1512 (11 June). Chart. — Belonged in 1882 to Count Pietro Gradenigo at Venice.

5) 1519. Atlas, consisting of 7 maps, some of which are reproduced in lithography in SANTAREM's atlas, and in chromolithography by KUNSTMANN, VON SPRUNER, and THOMAS. — Munich, Royal Library.

6) 1524. Typical portolano. — Milan, Bibl. Ambrosiana.

7) 1527 (according to U.-A. subsequently altered to 1587). Map of the world, consisting of 2 charts, one (0.77 X 0.60 m.) of the Old, the other (0.93 X 0.60 m.) of the New World. HARRISSE: *The discovery of North America*, Paris 1892, pp. 216 and 553. — Milan, Bibl. Ambrosiana.

8, 9) 1535. Two charts, one in the State Archives at Turin, the other in the cathedral library at Toledo.

10) 1536. Chart, signed: "Composuit hanc cartam in Janua anno domini 1536 die quinta februarii Vincent.(!) de Majolo." According to U.-A., II, p. 281, *Vincent.* may possibly be read *Visconte*. — Pesaro, Bibl. Oliveriana.

11, 12) 1537 and 1547. Two charts at Paris, the former in Dépôt des cartes et plans de la marine, the latter in Bibl. nationale.

13) 1549. Atlas, consisting of four maps, chiefly of the Old World; small parts of America are included on two of the maps. — Treviso, Bibl. comunale.

Besides the above-mentioned maps, Vesconte Maiolo together with JOHANNES MAIOLO made a portolan-atlas (0.90 X 0.65 m.), signed: "Vesconte et Joannes de Maiollo fecit in Janua de anno dñy 1525 die VIII Zulii." — Parma, Bibl. reale.

b) Jacobus Maiolo, Vesconte's son.

1, 2) 1551 and 1553. Two charts, the former in the Royal Library at Munich, the latter in the possession of a private person at Genoa.

3) 1558. Typical portolano. W. RUGE, *op. cit.*, p. 400. — Rome, Bibl. Casanatense.

4) 1561 (25 April.) Chart of Europe, West Asia, and North Africa (1.25 X 0.90 m.); besides on the same sheet a map on a smaller scale, also including the part of America then known. *Catal. della prima mostra geografica italiana*, Genova 1892, p. 160. Compare also *Catal. de la bibl. de S. E. D. Paulo Borghese*, I, Roma 1892, no. 4 620, where a small incomplete reproduction is given. — Municipality of Genoa.

5) 1561 (25 Nov.). Typical portolano (0.82 X 0.40 m.), signed: "Jacobus de Maiolo filius magistri Veschonti composuit hanc cartam in ianua anno domini 1561 XXV novembris in Iospitaletto." — Rome, Bibl. Vittorio Emanuele.

6) 1562. Chart. — London, British Museum.

7) 1567 (3 Jan.). Chart of a part of the Coast of Italy. — Rome, Bibl. Vittorio Emanuele.

8) 1567 (20 Febr.). Typical portolano, signed: Jacobus Majolus condam Vescontis fecit hanc cartam genue anno Domini 1567 die 20 Februarij." It seems as though a younger firm were here reminding us that it is a continuation of an older well-known firm. — Has belonged to the Libris library at London.

* The above-mentioned works by Freducci are all quoted by U.-A. except Conte Freducci's maps nos. 3, 12 and 13, as well as no. 2 by Angelo Freducci.

c) **Baldassare Maiolo.**

1) 1583. Typical portolano (0.78 × 0.62 m.). — Florence, Bibl. nazionale.

2) 1586. Chart (0.73 × 0.35 m.). — Ventimiglia Ligure.¹ The map by Maiolo quoted by U.-A. under no. 228, p. 154, may be the same as the one previously quoted under no. 153, p. 113.

Many of Maiolo's works are exceedingly important for the cartography of the New World, and I shall subsequently have the opportunity of returning to them.

1511. **Salvat de Pilestrina** of Majorca. Chart. U.-A., II, p. 239. — Munich, the Archives of the War Office.

1514. **Battista Genovese.** Typical portolano (0.91 × 0.54 m.). U.-A., II, p. 108. — Wolfenbüttel, Ducal Library.

1520. **Johannes Xenodochos** of Corfu. Three charts, which together form a typical portolano. (0.39 × 0.27 m.) U.-A., II, p. 239. — Venice, Museo civico.

1520—1588. **Jacobus Russus** of Messina. The works by this map-draughtsman or map-drawingfirm quoted in U.-A. are dated 1520, 1535, 1549, 1550, 1565 and 1588, besides which is a portolano of 1537, mentioned in *Catal. of additions to the Brit. Mus. manuscripts* 1861—75, no. 27 471. They seem to include only the territory of the normal-portolano.

1524—1530. **Francisco Rodrigues.** Portolan-atlas, reproduced by SANTAREM.

1527—1564. **Battista Agnese.** Battista Agnese is one of the most prolific portolan-draughtsmen of the 16th century. His works are distinguished by a remarkable elegance and a technical perfection, that make them real works of art. On account of their lack of originality they are less important in a purely geographical respect than their exterior promises. They, however, formed, may be for some years only, what one might call the normal-portolano of the new world, and for that reason deserve a closer study than has been bestowed on them up to the present. Besides, there is in Agnese an oval map of the world, on which ocean-routes are marked.

The oldest Agnese-portolano quoted in U.-A. (II, p. 113) is of 1527. It is kept in the British Museum, which further possesses works by the same author dated 1529, 1536, 1564 (cf. *Catal. of additions to the Brit. Mus. manuscripts* 1861—75, no. 25 442). In the Marcian Library there are Agnese-portolanos of 1545, 1553(?), and 1554 (reproduced by ONGANIA, XVII). Besides there are works by this industrious map-draughtsman in the Laurentian Library at Florence (atlas with 13 maps, 1543); at Munich (atlas with 13 maps, dated 1536—1550, the maps of America reproduced by KUNSTMANN); Paris (1543 and 1548); Dresden (1544); Gotha (1546); Catania (1562), and others. An exceedingly fine undated portolan-atlas kept in the Royal Library at Stockholm is evidently by Agnese; it is here partly reproduced on pl. XXIV. Agnese is also without doubt the author of an anonymous undated portolan-atlas with 15 charts, in the Bibl. nazionale at Florence, also of *le portulan de Malartic*, described by PAUL GAFFAREL in *Mémoires de la Société bourguignonne de géographie et d'histoire*.²

1530—1580. **Dominicus Vigliarolus** (Oiliarolo) of Calabria.

1) 1530. Portolano of the Mediterranean and the west coast of Europe. Signed: "Presbiter Dominicus Vigliarolus Calaber Stilensis me fecit in inclita urbe Neapoli 1530." W. ERMAN (*Verh. d. Gesellsch. für Erdk. zu Berlin*, X, 1883, p. 383). — Berlin, Royal Library.

2) 1577. Portolan-atlas. U.-A., II, p. 283. — Belonged in 1882 to Signor Guggenheim of Venice.

3) 1580. Elaborate portolano of the Black Sea and Mediterranean as well as the west coast of Europe and part of that of Africa with the neighbouring islands. *Catal. della Bibl. del fu conte G. Manzoni*, Città di Castello 1894, no. 6 451.

1532—1588. **The Olives family.**

a) **Bartolomeo Olives** of Majorca.

1) 1532. Portolan-atlas with 11 maps (0.37 × 0.29 m.), signed: "1532 in Messina nel Castello del Salvador, Bartolomeo Olives, Maiorchino." The work is carefully executed and includes the greater part of the then known world. — Pisa, University library.

2) 1538. Portolano. — Venice, R. Scuola sup. di commercio.

3) 1559. Atlas, consisting of 5 maps, described by ZURLA, subsequently lost.

4) 1561. Atlas, consisting of 12 double-folded plates with elaborately drawn maps of the coasts of the known world. Described by U.-A., II, p. 248. — Naples, Archivio di Stato.

5) 1563. Typical portolano (1.00 × 0.77 m.). *Catal. della Bibl. del fu conte G. Manzoni*, IV, Città di Castello 1894, no. 184.

6) 1575. A chart mentioned by SANTAREM in *Bull. de la Soc. de géogr.*, 3^e série, VII, Paris 1847, p. 308, drawn *en el castillo del Salvador in Messina*. — Formerly belonged to Vicomte de Santarem.

7) 1583. Typical portolano (1.00 × 0.595 m.) with the Virgin Mary and Child Christ, drawn *en Misina en el Castillo del Salvador*, thus in the same place as the maps quoted above under nos. 1 and 6. Probably a portolan-manufactory existed, for a long succession of years, in Castello del Salvador in Messina. — Belonged in 1882 to G. de Franceschi at Venice.

8) 1584. Portolano (1.03 × 0.67 m.). *Catal. des documents géogr.*, Paris 1892, p. 4. Partly reproduced in *Bidrag till Nordens äldsta kartografi*. — Paris, Bibl. nationale.

9, 10) 1584, 1585. Typical portolanos, dated from the same place as nos. 1, 6 and 7. — Venice (Museo civico) and Florence (Bibl. Riccardiana).³

b) **Jaume Olives** of Majorca. By this man there are typical portolanos, all drawn on a whole skin, of the years 1557 (Pavia, University Library); 1559, dated Messina (Naples, Bibl. nazionale); 1561, dated Messina (Rome, Bibl. Vitt. Em.); 1563, dated Napoli (Venice, Museo civico); 1566, dated Marseilles (*ibid.*). U.-A., II, pp. 244 *et seq.*

Jaume Olives was probably a Mediterranean skipper who occupied his leisure with portolan-drawing as an extra source of income. Several other persons of the same family devoted themselves to the same profession. Thus there is in my collection a chart by the son:

c) **Domingo Olives.** Typical portolano, drawn on a whole skin, with a part of Scandinavia and the Baltic, Friesland, and the west coast of Africa to Cape Verde (0.79 × 0.70 m.). Between *illa de brasill* and Ireland is written: "Domingo figlio de maistre iauime olliues mallorquin en napoli anno 1568." On the neck of the parchment the Virgin Mary with the Child is to be seen. The interior of the countries is adorned with coarsely and badly drawn animals, as well as standards among which are to be found numerous examples of the anachronisms so common in the portolanos. Here reproduced on pl. XXIX.

1537—1565. **Georgio Calapoda** of Crete.

1) 1537. Atlas consisting of 6 maps (0.43 × 0.33 m.), including the Mediterranean and Black Sea and the west-

¹ The above mentioned works by the Maiolo family are included in U.-A. except Jacobus Maiolo's maps nos. 3 and 4.

² In quoting the maps of Agnese, I have mainly followed U.-A. A list by HARRISSE (*op. cit.* p. 629) includes 21 maps, signed with Agnese's name and dated from March 10, 1536 to May 25, 1564. Besides these there are 18 unsigned works, which also are considered to have come from Agnese's atelier. More than half of the maps signed Agnese, are preserved in libraries outside Italy. The most important works on Agnese's maps are quoted by M. FIORINI: *Sopra tre speciali proiezioni meridiane e i mappamondi ovali del secolo XVI* (*Memorie d. Soc. geogr. italiana*, V, Roma 1895, p. 177).

³ The above-quoted maps by B. Olives are mentioned in the work of U.-A., except nos. 5, 6 and 8.

coasts of Europe and Africa to Cape Verde. U.-A., II, p. 243. — Venice, Bibl. Marciana.

2) 1550. Large map, including Europe, western Asia to the Indus, Africa, the Atlantic ocean to Newfoundland (Baccallareum regio), West India and Brazil (1.06 × 0.68 m.). Numerous drawings of cities, flags, arms, etc. MATKOVIC (*Mittheil. der K. K. geogr. Gesellsch.*, VI, Wien 1862, p. 101), U.-A., II, p. 243. — Venice, Museo civico.

3) 1552. A portolan-atlas drawn on parchment (0.29 × 0.215 m.), belonging to the library of Skokloster, at present deposited in the State Archives at Stockholm. Here completely reproduced in colours on pls. XXV, XXVI. With its tasteless drawings and gaudy colours it gives an idea of what may be called *vulgar* portolan-literature of the 16th century. On the map of the world belonging to it the 110th meridian is left out.

4) 1560. Part of a portolan-atlas, consisting of 3 maps (0.375 × 0.225 m.). Signed: "Georgio Sideri dictus Calapoda

1542. **Rocco dall' Olmo** of Ancona. Chart. U.-A., II, p. 129. — Siena, Bibl. comunale.

1544. **Francesco Lodesano**, a Spanish jesuit. Chart. U.-A., II, p. 292. — Belonged in 1882 to G. Canepari of Piedmont.

1545. **Diego** A Spanish portolano drawn on a whole skin and dated "puerto de Santa Maria anno domini 1545" (0.92 × 0.62 m.). Includes the west of Europe and the north-west of Africa. Peculiar as regards the drawing of the Scandinavian peninsula and Iceland. The map is much injured by damp. — Belongs to the library of Skokloster, at present deposited in the State Archives at Stockholm.

16th century (middle). **The Dijon-portolano**, undated anonymous portolano in the town-library at Dijon (1.09 × 0.68 m.). Reproduced and excellently described by GAF-FAREL in the work quoted on p. 20. Gaffarel tries to show that the map is of the middle of the 15th century. This determination is without doubt incorrect. Since, as I have



22. Arabic portolano, 1600 or 1601. Western part. From Jomard. (Orig. size 0.725 × 0.485 m.)

cretensis fecit nel anno domini 1560." U.-A., II, p. 246. — Venice, Museo civico.

In U.-A. there are further quoted the following works by the same portolan-draughtsman.

5) 1561. Chart of the Mediterranean, Black Sea, and the part of the Atlantic near the Strait of Gibraltar. — Venice.

6) 1562. Large map of Crete (1.41 × 0.61 m.). — Venice, Museo civico.

7) 1563. Portolan-atlas, containing maps of the two hemispheres, of America, Africa, the Mediterranean and Black Sea, Britain, Crete and Rhodes (0.50 × 0.36 m.). — Venice, Bibl. Marciana.

8) 1565. Chart of the territory of the normal-portolano. — Rome, Museo Borgia.

shown above, no dated portolano with a *system of compass-roses* is known before the 16th century, we must also consider this map richly adorned with compass-roses to be a little altered copy made during the 16th century of an older work. Hence here is still to be seen the papal standard at Avignon and no crescent at Constantinople. But such anachronisms are characteristic of the portolanos. On Domingo Olives' map of 1568, Avignon for instance, but not Rome, is adorned with a papal standard, the Genoese flag still floats beside the Turkish over Constantinople, and Rhodes is marked with a white cross.

16th century (second half?). **Francesco Gisolfo**. Atlas, containing 15 maps, among which are two maps of the world and maps of the four continents (0.28 × 0.26 m.). U.-A., II, p. 169. — Florence, Bibl. Riccardiana.

16th century (second half). Gieronimo Costo of Genoa. Two undated charts, both signed: "Carta navigatoria fatta per me Gieronimo Costo genovese in Bar[celona]." The one forms a typical portolano (0.78×0.62 m.), the other includes the Baltic together with Sweden and Denmark (0.80×0.63 m.). U.-A., II, pp. 150, 175. — Genoa, Soc. ligure di storia patria.

1557—1575. Diego Homen of Portugal.

1) 1557. Chart, signed: "Diegus Homẽ Cosmographus me fecit año d. 1557." U.-A., II, p. 244. — Venice, Museo del R. Arsenale marittimo.¹

2) 1558. Portolano, consisting of 12 maps of the Old and New Worlds. *Catal. of the manuscript maps, charts etc.*, I, London 1844, p. 27. — London, British Museum.

3) 1559. Atlas, consisting of 8 maps, which only include the territory of the normal-portolano. Reproduced in MARCEL's *Recueil de portulans*. — Paris, Bibl. nationale.

It is remarkable that, in spite of the nationality of the author, the maps by Diego Homen do not generally extend very far beyond the territory of the normal-portolano even on the coast of Africa. Homen's maps form the first typical portolanos engraved on copper that are known.² Such a copper-engraving of 1569, preserved in the British Museum, has been reproduced on a diminished scale on pl. XXVIII of this work. Forlani's dedication to Giacomo Murari says that the author of the map is "Giacomo Homen portoghese." According to the "complément" to the list of maps in Marcel *op. cit.* there ought to be another copper-engraving, dated 1571, of the same map and by the same engraver.

1557—1590. Antonio Millo of Venice.

1) 1557. Atlas. U.-A., II, p. 140. — London, British Museum.

2) 1582. Map of the World. — *Ibid.* (*Catal. of additions etc.* 1861—75, no. 27 470.)



23. Arabic portolano, 1600 or 1601. Eastern part. From Jomard. (Orig. size 0.645×0.485 m.)

4, 5) 1560, 1561. Two charts, the former at Venice (according to U.-A. one of the finest maps in the Marcian Library), the latter at Parma (Bibl. reale).

6) 1568. Atlas, consisting of 29 sheets (0.415×0.29 m.). Described by W. RUGE, *op. cit.*, p. 404. — Dresden, Royal Library.

7) 1569. The east part of the Mediterranean (0.785×0.69 m.). U.-A., II, p. 255. — Rome, Bibl. Vittorio Emanuele.

8) 1574. Chart, mentioned in the Table of Contents to MARCEL's *Recueil*. — Paris, Bibl. nationale.

9) 1575. Portolano. U.-A., II, p. 292. — Venice, Museo del R. Arsenale marittimo.

3) 16th century (end). Large atlas (1.02×0.685 m.), consisting of 12 sheets with a number of maps of both Old and New Worlds. U.-A., II, p. 173. Cf. also W. RUGE, *op. cit.*, p. 403. — Rome, Bibl. Vittorio Emanuele.

4) 1590. A work on navigation, with maps of several islands. Signed: "Arte del navegar. Antonio Millo Armiraglio del Zante fecit a. 1590 zenaro." U.-A., II, p. 216. — Venice, Bibl. Marciana.

1558. Bastian Lopez. Portuguese chart of various seas of Europe, Africa and America. — London, British Museum. (*Catal. of additions etc.* 1861—75, no. 27 303.)

¹ Possibly identical with this map is a "mappemonde manuscrite du cosmographe portugais André Homem 1557" (SANTAREM: *Recherches sur la priorité de la découverte des pays... au delà du Cap Bojador*, Paris 1842, p. CXII).

² The special-portolans of the Adriatic and the Archipelago, cut in wood, that are here reproduced on pl. XXVII, are about 20 years older.

1560—1592. Matheus Prunes of Majorca.

1) 1560(?). Chart, chiefly comprising the territory of the normal-portolano. Described in the above-mentioned works by GIUSEPPE DE LUCA and W. RUGE (see p. 20, note 17). Reproduced by DE LUCA. — Cava dei Tirreni, the Benedictine-monastery.

2) 1560. Chart, signed: "Matheus prunes in civitate maioricarum anno 1560." U.-A., II, p. 247. — Venice, Museo civico.

3, 4) 1586, 1588. Two charts, both in Paris (Bibl. nationale). The former reproduced in MARCEL'S *Recueil de portulans*.

5) Prunes also made a chart together with RAINALDO BARTOLOMEO DE FERRERIOS, in 1592. U.-A., II, p. 259. — Florence, Archivio di Stato.

1562—1569. Paulo Forlani. This skilful map-engraver has also left us two hand-drawn charts (U.-A., II, pp. 142, 145), both in Paris.

Homen's normal-portolano engraved by Forlani is here reproduced on pl. XXVIII.

1564—1586. Johannes Martines of Messina.

Of this draughtsman we possess several works, executed between 1564 and 1586 (U.-A., II, pp. 143—154, 283). Most of them seem to include only the territory of the normal-portolano, but some of the maps by Martines kept in the British Museum also refer to the newly discovered countries. This is especially the case with a larger atlas of 18 maps dating, though somewhat uncertainly, from 1578.¹ To judge from SANTAREM'S reproduction in colour-printing of the map of the west coast of Africa in Martines' atlas of 1567, his portolanos are executed with great care and splendour of colour.

1570. Bartolomeo Bonomini of Ancona. Chart of the Mediterranean. U.-A., II, pp. 146, 296. — Rome, Arch. Colonna.

1571. Giulio Cesare Petrucci. Chart. U.-A., II, pp. 146, 296. — Bologna, Museo Cospiano.

1578—1593. Jacobus Scotus of Levanto in Liguria.

1) 1578. Chart of the Mediterranean, the north and west coast of Europe and the north-west coast of Africa. U.-A., *Appendice*, p. 48. — Biella; has belonged to Quintino Sella.

2) 1589. Typical portolano (0.93 × 0.55 m.). Signed: "Iacobus Scotus januensis oppidi Levanti in Civitate veteri fatiebat 1589." U.-A., II, p. 156. — Venice, Bibl. Marciana.

3) 1592. Atlas (9 maps). U.-A., II, p. 283. — Verona, Bibl. capitolare.

4) 1593. Atlas (6 maps), drawn in Naples. U.-A., II, pp. 157, 296. — Bologna, Bibl. municipale Magnani.

1581. Mateus Griusco. Chart (0.82 × 0.44 m.). Signed: "Mateus Griusco in Civitate Maioricensi anno 1581." U.-A., II, p. 151. — Parma, Bibl. reale.

1589. Domingo de Villaroel. Portolano, including the Mediterranean, Europe, and North Africa. Signed: "Don Domingo de Villaroel, cosmographo de su Magestad, me fecit in civitate Neapolis, 1589." *Notice des objets exposés*, etc., p. 18. — Paris, Bibl. nationale.

1590. Muhammed Raus. Turkish chart of the Archipelago (0.80 × 0.585 m.). U.-A., II, p. 259. — Venice, Museo civico.

1590. Jaimes Dossaiga of Spain. Portolan-atlas, consisting of 4 charts (0.49 × 0.37 m.). Signed: "Jaimes Dossaiga fecit 1590." Includes Europe and north Africa. — Has belonged to R. Heredia at Madrid (*Catal. de la bibl. de M. Ricardo Heredia*, III, Paris 1893, no. 2850). Perhaps the same as is spoken of in U.-A., II, p. 292.

1590(?). Augustinus Russinus. Atlas in my collection. Consists of 3 maps (0.563 × 0.383 m.), two of which form a normal-portolano with sovereigns in full array and some

animal-scenes in the interior of the countries, while the third forms a special-chart of the Archipelago. The map was drawn at Marseilles. The date has been erased, but seems to be 1590. It is quite common for the date on portolanos to have been erased and altered; formerly this was done to make them seem younger and thus more desirable for skip-pers, subsequently in our time to make them appear of greater age and so more sought by collectors.

1592. Carlo da Corte of Genoa. Chart. U.-A., II, p. 157. — Belonged in 1882 to C. Morbio at Milan.

1593—1607. Vincentius Demetrius Voltius.

1) 1593. Atlas in my collection, including the territory of the normal-portolano with a special chart of the Adriatic (0.34 × 0.49 m.). The maps are carefully executed and tastefully coloured with gold-edged coasts. The general map is reproduced here on pl. XXX. The legends, which are quoted in the above pp. 25 *et seq.*, are distinctly written, in a hand imitating that of the beginning of the 15th century. This shows how slavishly the normal-portolano was copied so long as 300 years after the first maps of this kind were drawn. The date is altered by erasure to 1493. It is probably this portolan-atlas that formerly belonged to Nicolò Barozzi (U.-A., II, p. 157).

2) 1596(?) Typical portolano. According to SANTAREM (*Bull. de la Soc. de géogr.*, 3:e série, VII, 1847, p. 313) signed: "Vicentius Demetrius Voltius Rachuseus fecit in civitate Neapoli die 15 Iulii 1506" (ought probably to be 1596). U.-A., II, p. 106. — Rome, Bibl. Vaticana.

3) 1598. Typical portolano, signed: "Vin:us Demetrei Volcius Rachuseus fecit in terra Liburni, mensis Februarii 1598." *Notice des objets exposés* etc., p. 19. — Paris, Bibl. nationale.

4) 1601. Chart. U.-A., II, p. 285. — Bologna, Bibl. municipale Magnani.

5) 1607. Typical portolano (0.85 × 0.50 m.), signed: "Vincentius Demetrius Volcius Rachuseus fecit in Civitate Neapoli die XVII Februarii 1607. U.-A., *Appendice*, p. 49. — Florence, Archivio di Stato.

1596. Bartolomeo Crescentio. Fine portolano on a whole skin in my collection (0.96 × 0.58 m.). Here reproduced on pl. XXXI. Evidently the original of the chart dated the same year in *Nautica mediterranea*, Roma 1601 (N. fig. 24). On the neck of the skin is a long dedication to Cardinal Aldobrandino. The chart is dated "Romae Kal. Ian. anno MDXCVI" (the date has been erased).

This portolano is of interest as one of the first attempts to correct and improve the drawing of the inner sea in the normal-portolano dating from the end of the 13th century. Barents' attempt in the same direction was executed some years earlier. How small were the innovations that Barents and Crescentio introduced is shown by a comparison between Crescentio's portolano (N. T. XXXI) and Barents' chart (here figg. 29 and 30; Facsimile-atlas, figg. 21, 23 and 24) on the one hand and on the other the reproductions of the normal-portolano here given.

16th century (end?). Anonymous, coarsely drawn portolano, consisting of a general map of the Mediterranean (0.84 × 0.42 m.) and a special map of the Archipelago (0.57 × 0.42 m.). — Belongs to the library of Skokloster, at present deposited in the State Archives at Stockholm.

Besides the portolanos here enumerated, on which the dates of drawing and the names of authors are generally denoted, there is also extant a large number of anonymous works of the 16th century. Most of them only include the territory of the normal-portolano and are therefore, in spite

¹ According to U.-A. there ought to be two atlases of 18 maps by Martines, in the British Museum, the one dated 1570, the other 1578. This is not quite correct, since the following are the maps by Juan Martines there preserved: 1) Add. MS. 17540. Chart of Mediterranean &c., on a vellum roll, 1564. 2) Add. MS. 15714. Portolano with 7 charts, 1567. 3) Harl. MS. 3489. Portolano with 7 charts, 1578. 4) Harl. MS. 3450. Atlas with 18 maps, 1578(?). The date as it stands, is 1618, but the two middle figures have evidently been altered. Nine of the maps show portions of America. 5) Add. MS. 22018. Portolano with 6 charts, 1579. 6) Add. MS. 5019. Portolano with 7 charts, 1582. (F. A. Bather.)

of their completeness of execution, of small geographical value. In contrast to these, the hand-drawn charts of the 16th century, that include some part of East Asia or the New World, even when they are anonymous, afford much to interest the historian of geography. They have formed the subject of a number of monographs, to which I shall return in a following chapter. Here it is enough to recall the fact that such charts, chiefly from Italian libraries, are dealt with by UZIELLI and AMAT under nos. 139, 156, 166, 167, 183, 240, 241, 257, 262, 264, 265, 267, 268, 406, 412, 446, 450, 451, and 452.

Still during the seventeenth century unaltered typical portolanos were made for the use of voyagers in the Mediterranean and Black Sea as well as along the west and north-west coasts of Europe. For the skippers long preferred their old hand-drawn portolanos to printed charts, which at first seem to have had no little difficulty to "get on the market". Thus it is said in the introduction to the english edition of WAGHENAER'S *The light of navigation*, Amsterdam 1612: "Amongst manie Pilots there is an opinion, that they had rather use the written Cardes then such as are printed, esteeming the printed Cardes to be imperfect, and say that the written Cardes are much better and perfecter" etc. After all the skippers were not quite wrong in their prejudice; the printed charts, before Mercator's projection was introduced, were for some sailing-courses absolutely misleading. The profession of portolan-draughtsman therefore still continued to exist during this century, although its productions were much less finished than during the 15th and 16th centuries.

Among the portolan-draughtsmen of this period the most prolific were the **Oliva family**. Probably Oliva is only an Italian form of OLIVES. If so, the Majorcan family of map-draughtsmen, that executed most of their works at Messina during the 16th century, would still during the 17th have continued the firm in the same town under the name of OLIVA. The Christian names Johannes (Giovanni, Jaume) and Bartolomeo are common to both. By JOHANNES OLIVA there are in U.-A.'s list about 10 charts from 1587 to 1622, most of them covering the whole or part of the field of the normal-portolano.¹ Further there are mentioned in U.-A., 4 charts by FRANCISCUS OLIVA from 1594 to 1659, all comprising the district of the normal-portolano;² an atlas by SALVATOR OLIVA dated 1620, consisting of 7 maps, most of them including extra-European countries, as well as a typical portolano (3 maps), dated 1631; by BRASITO OLIVO (Oliva?) a typical portolano of 1633; by PLACIDUS OLIVA (or PLACIDUS CALOIRO ET OLIVA) 12 charts, drawn between 1615 and 1653,³ all of the district of the normal-portolano, so far as I have been able to judge from the descriptions. A work by GIO. BATT. CALOIRO ET OLIVA is dated 1673. Not one of the charts by the Oliva firm can have been of any importance in the development of geography or cartography.

The same is the case with the maps, that were drawn by **Giovanni Battista Cavallini** of Leghorn, dated 1639, 1642 (Royal Library at the Hague), 1644 (*Catal. of the manuscript maps* etc. in the *British Museum*, I, p. 34), 1654 and 1669 (*op. cit.*, p. 35), as well as by **Pietro Cavallini**, dated 1688. Also in my collection there is a portolan-atlas, signed: "Iouan Battista Cauallini in Liorno anno 1642." It consists of three maps drawn on parchment, two of which form an ordinary typical portolano and the third a special-chart of the Archi-

pelago. The island of Rhodes is still drawn in red with a white cross, and the cape at Alexandria has its usual lily-shape. The shape and coast-legends etc. of the Black Sea and Mediterranean are copied with slight alteration from the old originals.

The same is very likely the case with the other hand-drawn portolanos of this century, of which for the sake of completeness the following are here mentioned:

1600(?) Thomas Lupo. Typical portolano. Signed: "Mayde by Thomas Lupo, in Shadwell, neere unto the mill." — London, British Museum (*Catal. of the manuscript maps* etc., I, p. 32).

1600 or 1601. Muhammed ebn-Ali ebn-Ahmed al-Scharfi of Sfax. Arabic revision of an Italian portolan. The parts of the map that seem to be more independently worked out are of interest as an example of the Arabs' peculiar style of map-drawing. Dated the year 1009 after the Hegira (= 1600 or 1601 A. D.). Reproduced by JOMARD, also here in figg. 22 and 23.

1607. Andrea Rios. Catalan atlas. U.-A., II, p. 269. — Genoa, University Library.

1612. Nicola Reynolds of England. Chart of the Mediterranean and Black Sea. U.-A., II, p. 270. — Florence, Bibl. nazionale.

1612—1630. Alvise Gramolin of Venice. Two charts of parts of the same seas, both at Venice. U.-A., II, pp. 189, 285.

1613. Mario Cartaro of Naples. Hydrographical atlas, consisting of 13 maps of the coasts of the south of Italy. U.-A., II, p. 183. — Naples, Bibl. nazionale.

1613—1633. Gio. Francesco Monno.

1) 1613. Chart of the Mediterranean. U.-A., II, p. 183. — Rome, Palazzo Doria.

2) 1622. Chart of the Mediterranean. U.-A., p. 187. — Genoa.

3) 1633. Six charts drawn on parchment, accompanied by a lengthy sailing-direction written on paper, with the title: "Arte della vera navigatione con il regime della tramontana et del Sole. Di Gio. Francesco Monno di Monaco, chirurgo, con un Portolano con le coste figurate ecc. MDCXXXIII." U.-A., II, p. 223. — Genoa, University Library.

1615. Sebastian Condina of Messina. Typical portolano. U.-A., II, p. 185. — Venice, Bibl. Marciana.

1618. Petrus Cornetus. Typical portolano, Signed: "Fecit hanc chartam Petrus Cornetus anno salutis 1618. Tot Rotterdam." (*Notice des objets exposés*, etc., p. 26.) — Paris, Bibl. nationale.

1645—1650. Alberto di Stefano.

1) 1645. Atlas, consisting of 14 small charts of the Mediterranean (*Catal. de la bibl. de feu M. le Baron Walckenaer*, Paris 1853, no 2 906).

2) 1650. Portolano of the Black Sea and Mediterranean with the Virgin Mary and Child Christ. Signed: "Alberto di Stefano navigatore Genoua 1650." (*Catal. della bibl. del fu Conte G. Manzoni*, Città di Castello 1894, no 186.)

1646. Nicolo Guidalotto. Atlas, containing four charts of the district of the normal-portolano. U.-A., II, p. 194. — Venice, Bibl. Marciana.

1663—1669. J. F. Roussin of France.

1) 1663. Portolan-atlas (5 maps). U.-A., II, p. 275. — Venice, Museo civico.

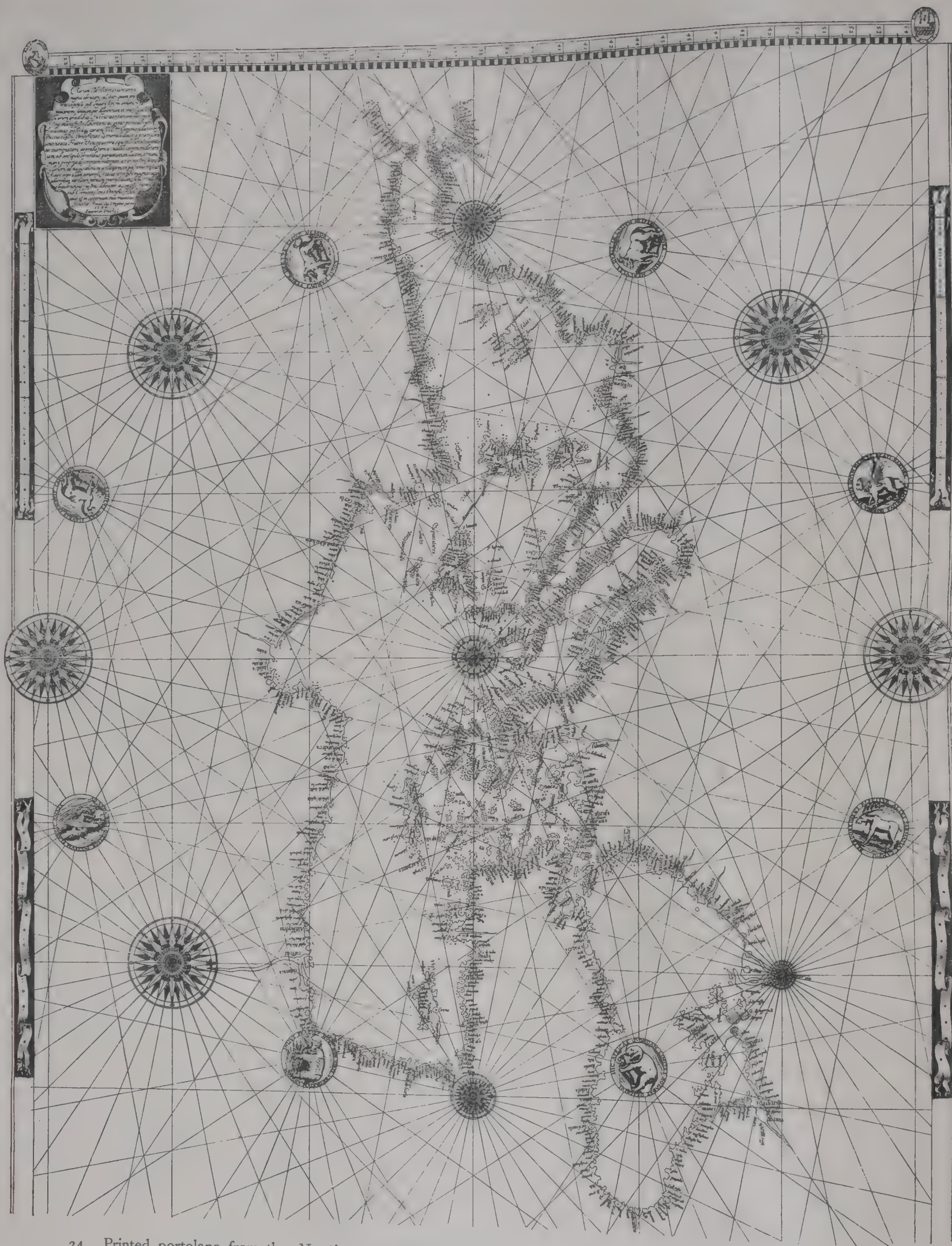
2) 1669. Portolano of the Mediterranean. (*Notice des objets exposés*, etc., p. 21.) — Paris, Bibl. nationale.⁴

¹ In Johannes Oliva's atlas of 1613, preserved in the British Museum, there are also maps of South Africa, South and East Asia, as well as America (*Catal. of manuscript maps* etc., I, p. 33). — A typical portolano executed by the same map-draughtsman, drawn in Messina in 1596 and preserved in the library of Göttingen university, is spoken of in HERMANN WAGNER'S *Leitfaden durch den Entwicklungsgang der Seekarten*, Bremen 1895, p. 20.

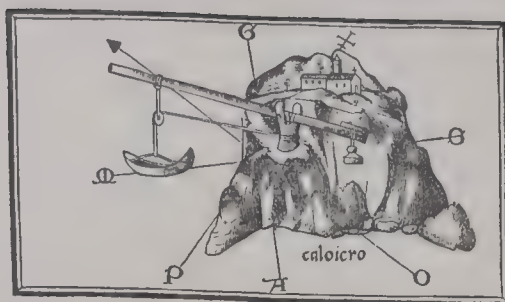
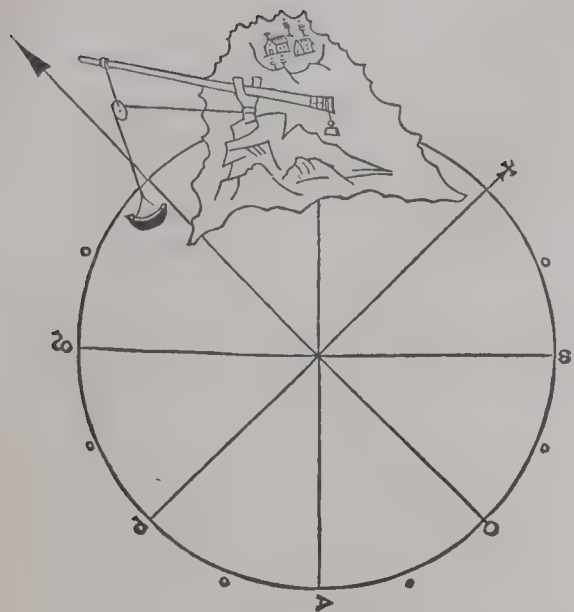
² A chart of the Mediterranean by Franciscus Oliva, 1562, is mentioned in *Notice des objets exposés* etc. p. 21.

³ A chart by Placidus Caloiro et Oliva, 1557, is quoted by W. RUGE, *op. cit.* p. 400.

⁴ An undated atlas by the same map-draughtsman is referred by MATKOVIĆ (*op. cit.* p. 105) to the middle of the 16th(?) century.



24. Printed portolano from the *Nautica mediterranea* of CRESCENTIO, Roma 1601. (Original size 0.760 X 0.595 m.)



25. The island of Caloiero, according to SONETTI (circa 1477), BORDONE (1528), and BOSCHINI (1658). (Reduced to 1/2.)

IX.

Printed Portolanos. Sailing-directions.

The far from complete list of hand-drawn portolanos of the 14th—17th centuries, given in the preceding chapter, shows that, for a long time after the invention of printing, numerous charts were still manufactured in sea-ports of the Mediterranean, for the most part by firms existing for long periods for that special purpose, and after patterns kept unaltered for generations. Under such circumstances it might be supposed that the portolanos of the latter half of the 15th century would have been early reproduced in print. So far, however, was this from being the case, that TH. FISCHER (*op. cit.*, p. 85) has maintained that the portolanos never were multiplied by either wood-cuts or copper-engravings.¹ Neither did I, when my Facsimile-atlas was published, know of any typical portolano of the Mediterranean and Black Sea published in print older than Barents' beautiful charts, printed in Amsterdam in 1595. But at the same time I pointed out that the hand-drawn maps had influenced printed map-literature in so far as they had formed the basis of several "tabulae novae" in the 16th century editions of PTOLEMY, and that at least one Italian Isolario from the 15th century was provided with small woodcut charts. Although the extensive researches into the history of cartography during the 15th & 16th centuries, undertaken of late years in connection with the celebration of the quadrigentenary of the discovery of America, have brought to light many previously unknown maps in both print & manuscript, yet they have not greatly added to the number of known printed sea-charts. This is shown by the following list of charts printed during the 15th & 16th centuries.

Circa 1477. Bartolomeo da li Sonetti's rhymed description of the islands of the Archipelago with accompanying maps (Venetia s. a.). This work, generally quoted as *Da li Sonetti's Isolario*, is minutely described in CARLO CASTELLANI's *Catalogo ragionato delle . . . opere geografiche a stampa che si conservano nella Bibl. del Collegio Romano*, Roma 1876, p. 66. Cf. also Facsimile-atlas, p. 36. My copy of this rare

book contains 48 maps of islands, coarsely cut on wood. The map of Eubœa is reproduced here as fig. 26.

Some of these small maps are provided with a distance-scale, as usual without any statement as to the meaning of the length-unit. This, however, can be determined approximately by measurements on the maps in cases where considerable distances are available for comparison with corresponding distances on modern maps.*

One scale-division in Sonetti's map 1, C. Malea—Crete,	= 6'.26
" " 6, Crete,	= 6'.57
" " 46, Eubœa,	= 6'.12
" " 48, Cyprus,	= 6'.16
Average = 6'.28.	

This comparison proves that half the scale-division on Sonetti's maps is almost exactly equal to one portolan-mile or half the scale-division on a portolano; but it bears no simple relation to either the Italian mile or the miliarium of the ancient Romans. The maps to which Sonetti wrote a rhymed text seem therefore to be old skipper-charts, of the same period as the maps here represented on plate III. The author himself, however, hints that his work is original & the result of long experience; for he says at the close of the introduction:

"Per aprobar questa opereta fata
per me bartolomeo da li sonetti
intendo de monstrar con veri effeti
quanto che londa egiea abia cerchatta.
Et se ho piu volte ogninsula chalchatta
e porti e vale e scogli i sporchi e i netti
col bosolo per venti ho i capi retti
col stilo in charte ciaschuna segnatta.
Quindece volte in tireme son statto
oficiale e poi patrone in nave."

A new edition of Sonetti's work appeared in 1532, also at Venice. It contains, besides the old maps, an oval map of the world, including the New World, and resembling

¹ Moreover they are seldom mentioned in the printed books of the 15th, 16th, & 17th centuries. In *Abrahami Ortelii . . . epistulae*, Cantabrigiae 1887, published by J. H. HESSELS, a "carta navigatoria" is, so far as I can find, alluded to in only one place, namely in Letter 39. The one in question had been purchased for Ortelius in Italy. In ORTELIUS' *Catalogus auctorum* no portolano of the 14th or 15th century is quoted.

* For determining the length-unit in Sonetti, I have made no measurements on the maps of the small islands Stalimene, Amorgo, Nio, Milo, Anafi, & Skarpanto, although they too have a scale. A slight error in the drawing would here affect the measurements too much.

BORDONE's map of the World reproduced on pl. XXXIX of my Facsimile-atlas.

Again in 1658 a prose revision of Sonetti's work was published, with maps beautifully engraved on copper, most of which as regards the outlines of the islands are true copies of the old wood-cuts of the 15th century, but with additional legends and an improved style of drawing. This work has the long & pretentious title: *L'Arcipelago con tutte le isole, scogli secche e bassi fondi, con i mari, golfi, seni, porti, città e castelli, nella forma, che si vedono al tempo presente con una succinta narrativa de i loro nomi, fauole et historie tanto antiche quanto moderne. Opera di MARCO BOSCHINI . . . In Venetia per Francesco Nicolini MDCLVIII.*

Sonetti's name does not appear on the title-page, nor is it mentioned in either dedication or preface. Thus the eminent painter and engraver Marcus Boschini has here proved guilty of an extensive plagiarism of Sonetti or of the original drawings and descriptions on which Sonetti's work was based.

So also the maps of the islands of the Archipelago in BORDONE's *Isolario* are in most cases copies of the maps in Sonetti with the addition of one or more legends. As an example of the correspondence that exist between the maps in these three works, I have on the preceding page given the drawing of Caloiero or Panegia that occurs in each (fig. 25).

1489. Albinus de Canepa. Chart in folio, printed on parchment (1.22 X 0.80 m.). Signed: "Anno Domini MCCCCLXXXIX in Janua de mense may. Albinus de Canepa Civis Janue composuit hanc cartam." Richly coloured. If, as UZIELLI-AMAT state (II, p. 82), this really is a specimen of printing, then this map, of which only one copy is known, is the first typical portolano that was published in print. — Milan, Bibl. ed Arch. Sola-Busca-Serbelloni.

1490. Andreas Benincasa. Portolan-Atlas, of which it is said in U.-A. (p. 92): "Carta nautica impressa su pergamena manoscritta, credesi originale, misura metri 0.50 X 0.85." It thus seems to be a chart, partly printed, partly hand-drawn. It is richly coloured, with red writing for some towns. Signed: "Andreas Benincase Anconitani composuit ane MCCCCLXXX." — Ancona, Archivio comunale.

If this chart really was produced, at least in part, by means of a printing-press, various other works by the Benincasa family, prolific as it was in the manufacture of charts, may have been produced in the same way, *i. e.* partly printed, partly drawn and coloured by hand.

The above works are the only charts of the 15th century published in print that I know of. During the 16th century the number is somewhat larger, although printed portolanos were exceedingly rare even then. The following are those I have seen or found quoted in literature.

About 1550. Two charts of the Adriatic and the Archipelago, cut in wood, here reproduced in phototype on pl. XXVII. As can easily be seen, they belong together; they are rather coarse but powerfully executed wood-cuts, taken from the same portolano, with, however, the loxodrome-net left out. The original probably was of the 15th century, as is shown by the lack of wind-roses. The circumstance that these are wanting, together with the geographical ignorance of the wood-cutter, has produced the unfortunate mistake that the map of Italy and the Adriatic has been twisted 45° against the sun, the NE. line having been taken for N. The map of the Adriatic is signed: "Stampata in la Inclita Citta di Venetia per Mattheo Pagano Intagliatore." **Mattheo Pagano** was a printer and wood-cutter of Venice, several of whose works are extant, most of them undated. The wood-cut of Cyprus dated 1538 (see our fig. 4), is by the same man, and he also published printed sailing-directions, one of which

dated 1558, is mentioned by MATKOVIC (*Mittheilungen der K. K. geogr. Gesellsch.*, VI, Wien 1862, p. 99).

If, as I believe, Canepa's portolano of 1489 and Benincasa's of 1490 were only in part produced by the printing-press, then the two charts of Mattheo Pagano mentioned above are the first *wholly printed* portolanos.

1560. Chart of the Atlantic ocean "Nauigationi dil mondo nouo;" according to inscriptions in various places on the map, executed by "**Nicollo del dolfinato** cosmographo del christianissimo Re," engraved on copper at Venice by **Gio. Franco Paulo di Forlani** of Verona, and published by **Gio. Franco Camosio**. The map is here reproduced in its original size on pl. XXVII. The first inscription denotes that this is a work by the celebrated traveller and author of several geographical works, NICOLAUS DE NICOLAY of Dauphiné, born 1517, died 1583. Besides a description of his own wanderings (*Navigaciones et peregrinationes orientales*) and a translation into French of PEDRO DE MEDINA's *Arte de navegar*, he wrote *La navigation du roy d'Escoce, Jacques cinquième du nom, autour de son royaume et isles Hébrides et Orchades, soubz la conduite d'Alexandre Lyndsay, excellent pilote escossois par DE NICOLAY, SIEUR D'ARFEVILLE. Recueillie et rédigée en forme de description hydrographique et représentée en carte marine, et routier et pilotage, pour la cognoissance particulière de ce qui est nécessaire et considérable à étudier en ladite navigation*, Paris 1583, with a map. This map I have not seen.

Nicolaus de Nicolay's map, reproduced on pl. XXVII, is of great interest as one of the first real loxodrome-maps of the Atlantic ocean, carefully executed and published in print. It is true that charts, *cartae marinae*, of this ocean had previously appeared in various editions of PTOLEMY from that of 1513 onwards, but these either are wood-cuts too coarsely and badly executed, or are drawn on too small a scale, to be compared with the beautiful copper-engraving in question.

Circa 1565. Loxodrome-map of the Atlantic Ocean, engraved on copper by **Ferando Berteli**. An almost unaltered copy of the previous map with the omission of the names of the author, engraver, and publisher there given. The early engravers of Venice seem to have considered themselves justified in engraving without more ado all the maps they could find and in supplying the copy with a new signature and new dedication, when it was to their advantage to do so. So it is here. For Berteli has in this case only re-engraved a map previously published, dedicating it as a new work to Signor Marco del Sole. The map has been reproduced by FR. MULLER in *Remarkable maps of the XVth, XVIth and XVIIth centuries*, I. *The Bodley Nyenhuis Collection at Leyden*, Amsterdam 1894. I shall later on reproduce an undated copy in my collection. The date, circa 1560, given by Fr. Muller is probably too early. For I have seen some 30 dated works by Ferando Berteli, and among those the following dates are to be found:

1 of 1561	2 of 1566
7 " 1562	3 " 1567
3 " 1563	1 " 1568
3 " 1564	1 " 1569.
9 " 1565	

From this it may be gathered that the time of Berteli's activity fell between 1561 and 1569, and that most of his works were executed in 1565. The maps of Cuba and Spagnola in Lafreri's atlas were executed in 1566, and should be about contemporary with the map here in question. In CASTELLANI's catalogue of maps in Lafreri's atlas, preserved in the library of the Collegio Romano there is mentioned on p. 240, under no. 8, another chart engraved on copper and signed *Berteli*. It has the same size as the one here

in question and is dedicated to Marco del Sole, but, according to Castellani, it only comprises the south part of the Atlantic.

1569. Chart by the Portuguese cosmographer **Diego Homen**, engraved on copper by **Paulo Forlani** of Verona. As Forlani in his dedication to Signor Giacomo Murari expressly points out, this is the first time that a *complete* portolano was published in print. The copper-engraving is, as regards the Mediterranean and the Black Sea, a true copy of the normal-portolano. Somewhat important alterations and additions have been introduced in the northernmost part of the map. The portolan-scale is missing; in its place is a scale in Italian miles, besides which the map is marked with degrees of latitude. Here an Italian "miglio" is taken as equal to 0.83. Forlani's copper-engraving seems to be rare. The reproduction given on pl. XXVIII is made from an original in the British Museum.

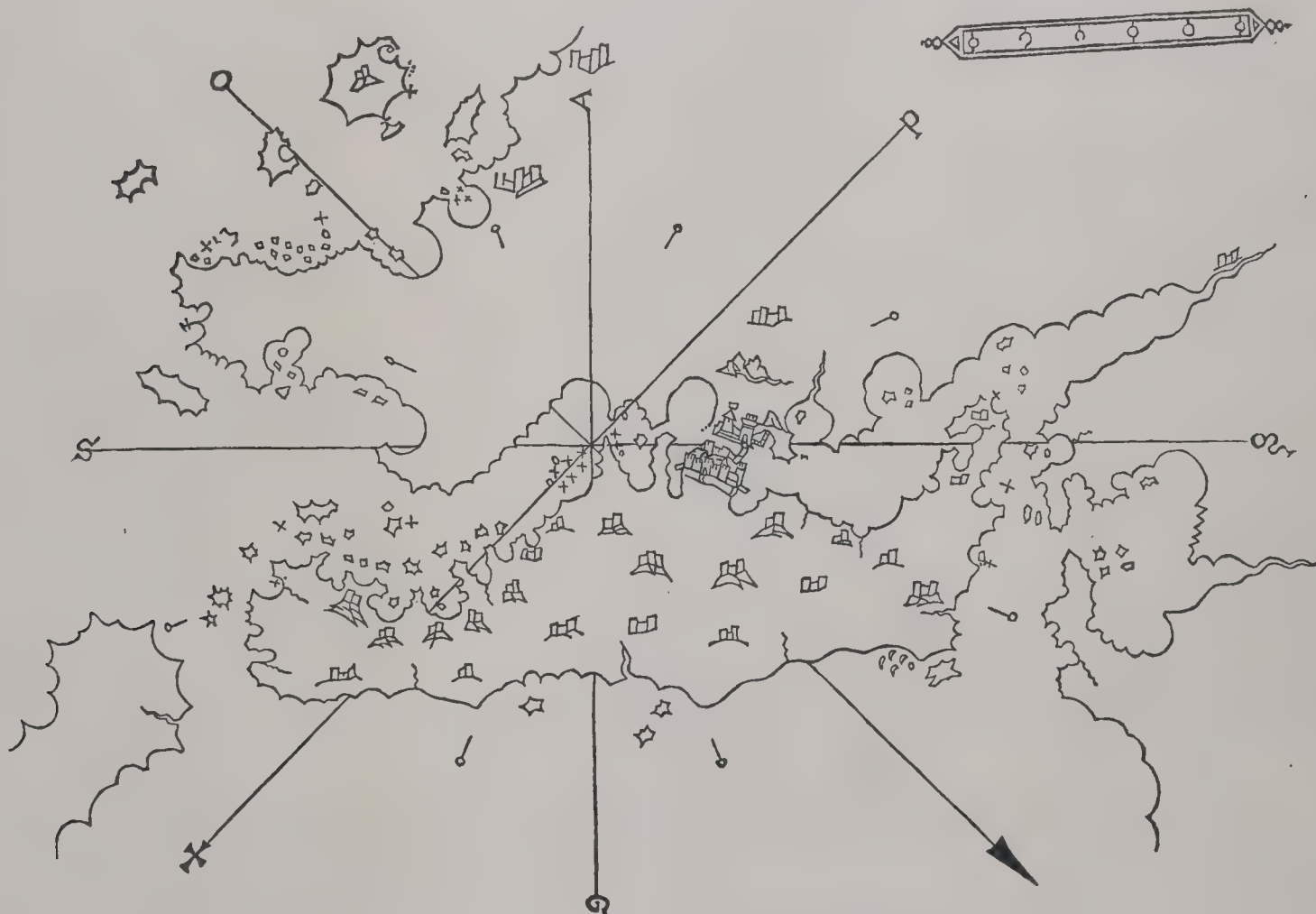
1595. **Willem Barentszoon** *Nieuwe beschryvinghe ende Caertboeck vande Midlandtsche Zee* etc., Amstelredam

I. General chart of the Black Sea and Mediterranean (0.855 × 0.418 m.). It is an almost unaltered copy of the normal-portolano, surrounded on both sides by a frame divided into latitude-degrees. Reproduced in my Facsimile-atlas, fig. 21.

II. A map of the coast of the Atlantic ocean on both sides of Gibraltar from Cape Bogador to the mouth of the Tagus, also taken from portolanos (0.548 × 0.394 m.). The orientation of this map follows no definite quarter of the compass. The latitude-degrees are set out in a broken line in the middle of the map. Reproduced, *op. cit.*, fig. 23.

III. The most westerly part of the Mediterranean (0.523 × 0.335 m.). Here reproduced fig. 29. Not graduated. There are two compass-roses drawn on the map, *viz.*, on the west side *Directorium nauticum italicum* (compass corrected for declination), and on the east side *Directorium nauticum vulgare* (uncorrected compass).

IV—X. Maps of other parts of the Mediterranean, drawn in the same style as the preceding, all without latitude-degrees and with arbitrary orientation. Of these I have already



26. Map of Euboea from BARTOLOMEO DA LI SONETTI'S *Isolario*, about 1477. (Reduced to 2/3.)

1595. According to P. A. THIELE: *Nederlandsche Bibliographie van Land- en Volkenkunde*, Amsterdam 1884, a French edition with the same maps as the Dutch was published under title: *Description de la mer Mediterranée* etc. par GUILLAUME BERNARD Pilote, chez Corneille Nicolas à Amsterdam l'An 1598. This last edition was affixed to the French edition of Waghenar of 1600. The author of this work is Barents, the celebrated arctic traveller (died 20/30 June 1597). It is exceedingly rare now a days, but at the beginning of the 17th century evidently served as the common guide to Dutch skippers on their voyages in the Mediterranean. Besides tables of the solar declination for four years, an exhaustive table of distances, latitude-tables, and a number of coast-descriptions accompanied by several sketches of the appearance of the coasts, this work contains the following charts, engraved on copper by J. Hondius and Pieter van den Keere:

A. E. N. II.

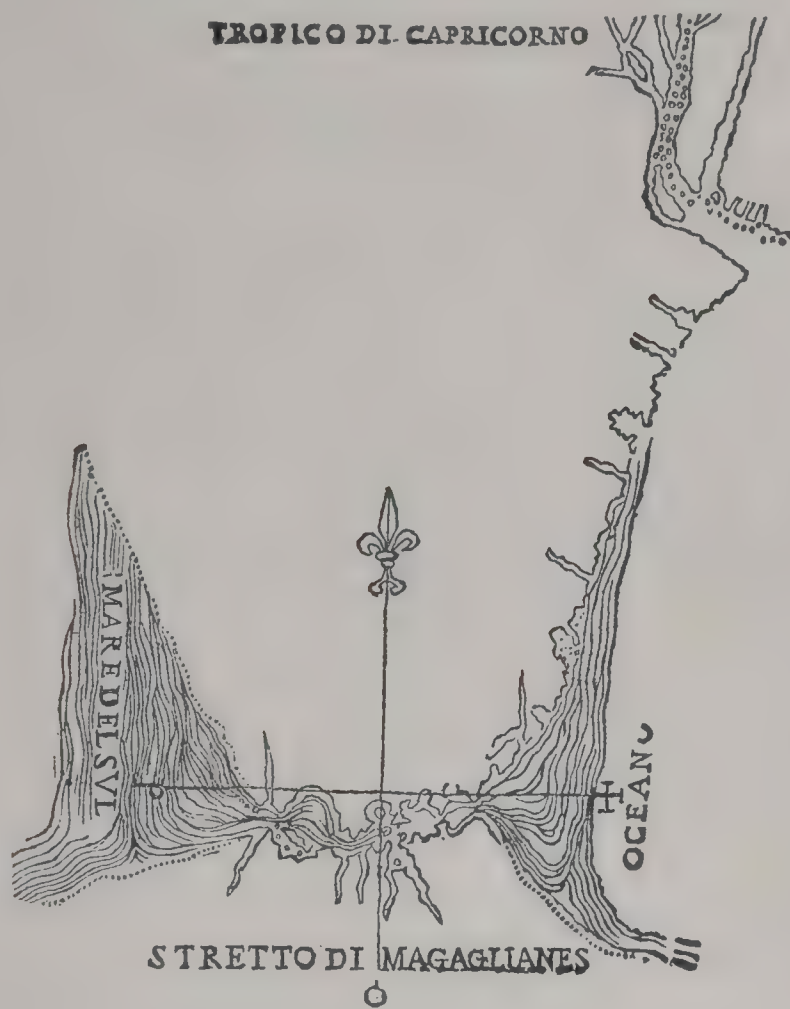
reproduced one (Facsimile-atlas, fig. 24). Another is here reproduced in fig. 30.

The work concludes with a *Havenwyser*, *dat is, speciale verclaringhe van allen Havenen, Clippen, Diepten, Ondiepten ende streckingen vande Golfo van Venetia, langs de Custen van Slavonia ofte Dalmatia: en van daer voorts voorby Griekenland oft Romania tot Constantinopoli ende landen van Natolia oft cleijn Asia*. This part of the work is a translation into Dutch of some Italian sailing-direction.

1601. The map of the Mediterranean in *Nautica mediterranea di Bartolomeo Crescentio Romano*. *All' illustriss. e reverendiss. s. Card. Aldobrandino. Nella quale Si manifesta l'error delle Chartre mediterranee degli Astro-labij, e Balestriglie e da doue essi errori procedono S'insegna l'arte del navigar nell' uno, e l'altro Mare Vi e il Calendario Nautico e Romano et molti vaghi Istru-*

menti appartenenti alla Navigazione Et un portolano di tutti i porti da stantiar Vascelli co i loghi pericolosi di tutto il Mare mediterraneo, Roma 1601 (at the end: 1602). The map of the Mediterranean is here reproduced in fig. 24. It corresponds exactly with the same author's hand-drawn portolano. Besides this, there occurs in connexion with the author's account of the tides (p. 307) the annexed special chart of Magellan's Straits. This chart is almost contemporary with CORNELIUS WYTFLIET's beautiful but hardly more correct chart of the same straits in *Descriptionis Ptolemaicae Augmentum*, Lovanii 1597.¹

Crescentio's thick quarto volume is of importance to the student of the navigation of the Mediterranean at the close of the 16th century, and it ought also to be consulted by those engaged in the difficult task of deciphering the calendars and nautical diagrams that are met with in several portolan-atlases.



27. Magellan's Straits from CRESCENTIO's *Nautica mediterranea*, 1601. (Original size.)

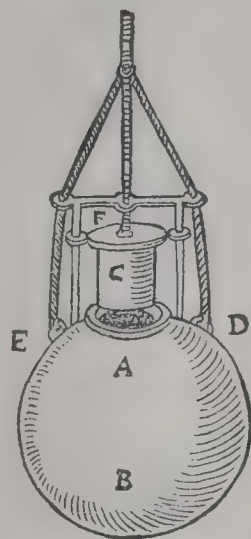
On pages 312 *et seq.* is inserted a *Nota particolare del tempo e l'ora de i flussi & reflussi del mare Oceano Occidentale. Tratta del Piloto Biscaino, che introduce ne' suoi Dialoghi del Flusso, la buona memoria di NICOLÒ SAGRI nobile Raguseo*. I have not been able to find any notice of Nicolo de Sagri or of any work written by him in the literature to which I have had access. To judge from the limits of the districts for which the tides are denoted, I should imagine that the tidal guide of the Biscayan pilot dated from the first half of the 15th century. For projecting points and open roads the time of the tides is generally denoted 15' to 30' earlier than by the hydrographers of to-day. This may depend on errors of obser-

¹ For the different editions of this work reference may be made to my Facsimile-atlas, pp. 29 and 133. It contains 19 maps, beautifully engraved on copper, of different parts of the New World, 18 of which are reproduced *op. cit.*, figg. 83 and 84 and pl. LI. On account of the title, Wytfliet's work has been included in several lists of the editions of Ptolemy's Geography, although it does not contain a single line by the Alexandrian geographer, and treats of that part of the world which was unknown to him.

vation at a time before seamen had access to reliable watches or chronometers. But in the English Channel and in deep or intersecting bays the deviation often seems to be too great to have been due to that cause. It would be worth while examining whether a real change may not have resulted from changes in the depth of the sea. Similar notes on the tides are also found in the pamphlet quoted below, printed at Venice in 1490, and ascribed to CADAMOSTO, as well as in a paper MS. preserved in the Commerz-Bibliothek at Hamburg, headed *Altes See-Buch seculi ut videtur XIV*, and published under the title of *Das Seebuch von KARL KOPPMANN*, Bremen 1876.

Finally it may be mentioned that on p. 286 of *Nautica mediterranea* there is figured the apparatus for bringing up water from the depths of the sea, shown in the annexed figure. This water was supposed to be free from salt(!). In *Kritische Untersuchungen*, I, p. 260, HUMBOLDT relates that so early as 1500 A. D. Diego de Lepe used a water-heater (*escalfador de barbero*) for bringing water up from depths of as much as 8 fathoms at the mouth of the Yviapari or Orinoco.

Among maps executed more or less in the same style as the portolanos may further be counted a number of other printed maps of the 16th century, e. g. *Orbis typus univer-*



28. Deep-water-collector, from CRESCENTIO's *Nautica mediterranea*, 1601. (Original size.)

salis juxta hydrographorum traditionem in PTOLEMY, Argentinae 1513 (see my Facsimile-atlas pl. XXXV); LAURENTIUS FRISIUS' map with the same title in PTOLEMY, Argentorati 1522 (*op. cit.* pl. XXXIX); as well as *Carta marina nova tabula* in PTOLEMY, Venetia 1548, and in all later Italian editions of the Alexandrian geographer (*op. cit.* pl. XLV). A variant of this *carta marina* is reproduced here in fig. 32, taken from the edition of Ptolemy that was published by the brothers Galignani at Venice in 1598, and from that issued by their sons at Padua in 1621. It is rather remarkable on account of the enormous extent given to the antarctic continent, probably on the ground of theoretical speculations; for it was believed that the laws of equilibrium demanded that the area of the continents should be the same on both sides of the equator.

The list here given is doubtless very incomplete. Maps of this kind were generally published on loose sheets, and every collector knows how such prints disappear without leaving a trace. The above list is, however, sufficient to show that typical portolanos or parts of them were repeat-

edly published as wood-cuts or copper-engravings during the 15th and 16th centuries. Great also has been the influence that the normal-portolano, the skipper-chart of the close of the 13th century or the beginning of the 14th, exercised on the development of cartography, directly by giving to the Mediterranean and Black Sea and to the west

& north-west coasts of Europe a more correct shape than they had in the maps of Ptolemy, indirectly by breaking down the prejudice that for so long made map-draughtsmen the slavish followers of the pattern set by the great Alexandrian geographer or of other theoretical images of the earth evolved in the studies of the learned.

Sailing-directions.

Long before the normal-portolano was compiled, sailors, in the Mediterranean and Black Sea, had access to manuscript accounts of distances and courses between the ports, rules how the latter ought to be put into, information as to rocks and shoals, etc. These written *portolanos* or *reading-charts*, *reading-maps* (*lässjökort*, *läskartor*), as they were called in the North, were easier to copy, easier to alter and improve, than the map-portolanos. It was probably for that reason that they were from time immemorial distributed among the skippers of the Mediterranean in numberless copies and with a content which never, like that of the normal-portolano, received once for all a fixed form. Written for men of a certain profession only, they attracted attention only in professional circles, and were only exceptionally preserved in the archives and libraries of the Middle Ages. Most of these reading-charts are therefore lost. After the invention of printing some were published in print, for the use of seafarers, generally in the shape of pamphlets, issued in several editions, the language of which was as careless as the typography. But even of these printed copies by far the greater part is lost. This may be gathered from the fact that those still in existence, when they are not appendices to other greater works, are always bibliographical rarities, one or two copies of which are often all that are known. They have, however, in later times been eagerly sought after because of their great interest in connection with the history of commerce and navigation. For the history of culture they have a further value as being continuations and revisions of Scylax' Periplus and the Stadiasmus, and even the philologist may glean from them something of ancient folk-dialects. I shall therefore, before going further, give a brief account of the manuscript or printed works of this kind, that I have myself seen or found mention of in literature.

A. Manuscript sailing-directions for the district of the normal-portolano, from the 14th and 15th centuries.

1306—1320. Marino Sanudo. The oldest dated sailing-direction of the Middle Ages extant is that inserted in MARINO SANUDO's *Liber secretorum fidelium crucis*, Lib. II, Pars. 4, Cap. 25 with the heading: *Continet descriptionem Riperiae marinae Soldano subjectae et propriorum nominum de marina, terrarum, portuum ac insularum, succarum et milium, quanto differunt uno ab alia et similiter partium terrarum Regis Tunisii, quae quidem cum praedicta Riperia confinia participant*, and cap. 26, with the heading: *Maritimae contratae cui Rex Armeniae dominatur* etc. Of Sanudo's work several manuscript copies are still preserved in European libraries. Long ago, with a number of other works concerning the crusades, it was published by BONGARS in *Gesta Dei per Francos*, Hanoviae 1611.

As an example of the style of the part of the work here in question, the following extract may be quoted:

"De S. Nicholao de Livixo ad caput Trachili, sunt miliaria quinque: bonumque habet portum, aquam in habundantia in insula cisternarum; nec dubitatur ex parte terrae.

"A Trachilo usque ad portum terrae de Macre, miliaria sunt XV, bonum habet portum, in cuius introitu, sub aqua circa duos vel tres pedes est quaedam sicca; aquamque habet potabilem in affluentia, nec ex parte terrae aliquatenus dubitatur.

"De Macre usque Copim, miliaria sunt decem: bonumque habet portum et tutum, tam ex parte maris, quam terrae: aquam in insula copiose retinet cisternarum.

"De Copi usque Guiam, miliaria sunt viginti: bonum portum habet, ex parte terrae securum, aquamque affluenter, tam in Insula, aquam etiam Astaria.

"A Guia usque Prepiam, miliaria sunt decem: habet aestivo tempore bonum portum, dum ex parte terrae securitas habeatur: Deinde intratur flumen quod septem pedum altitudinis habet aquam. Hocque modo onerantur navigia quae deferunt lignamina in Aegyptum."

The resemblance in style to Scylax' Periplus and the Stadiasmus clearly shows that the work is a direct revision or imitation of ancient Greek or Byzantine patterns, of course with the alterations that the lapse of a thousand years had brought about in the state of the ports and their political importance, so far as those alterations were within the writer's knowledge. In one part of Sanudo's coast-description there occur statements in the language of the compass as to the mutual situation of certain places. Such statements are wholly wanting in the old periplus, and their addition is a sign that a thorough reform of the whole of navigation had taken place since antiquity. Such statements, however, occur only in certain parts of Sanudo's sailing-direction, from which fact it may perhaps be concluded that at the time of Sanudo the reform had only just begun to be carried out, perhaps in connection with the use of the magnetic needle for determining the course of vessels.

14th century. An anonymous and undated sailing-direction of the 14th century, describing the route from Alexandria to Venice, from Akka to Constantinople, and from Akka to Venice, is mentioned by UZIELLI-AMAT, II, p. 205. — Venice, Bibl. Mariana.

1435. Gratosus Benincasa. In the atlas preserved at Ancona in the Archivio comunale & referred to on page 60, besides a number of charts comprising different parts of the Mediterranean and the sea of Marmora, there is a sailing-direction dated 1435 and signed: "In questo libro jo Gratoso Beninchasia fara menzion di porti e luoghi di terre de Marina . . ." etc. (U.-A., II, p. 66.)

1444. Alcune Raxion de Marineri de mi Pietro de Versi. To judge from the description by ZURLA (*Sulle antiche mappe* etc., II, Venezia 1818, p. 342, foot-note) this is a manuscript guide for navigators. Besides sailing-directions and statements of distances between the ports, partly in "miglia", partly in "leghe", this collection also contains astronomical tables, accounts of the tides for England, Ire-

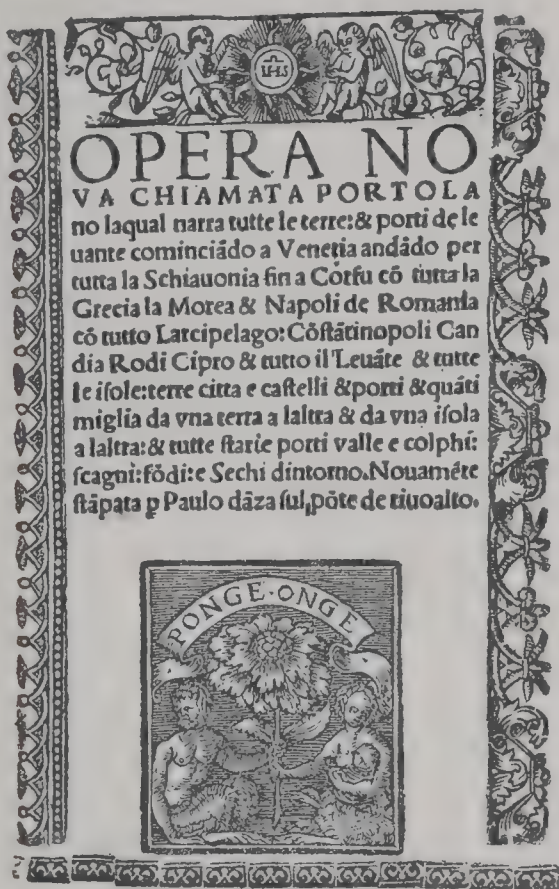


330. Chart of the Adriatic by WILLEM BARENTS ZON, 1595. (Orig. size 0.375 X 0.40 m.)

land, and the west coast of Europe, the summary traverse-tables then in use or *La raxion chiamata de martologio per navigar a mente*, the statutes concerning galleys published in 1428 by the Captain-general Moncenigo, etc. This interesting MS. formerly belonged to the Abbé Morelli, but is now preserved in the Marciana Library at Venice. It is not published in print.

UZIELLI and AMAT further mention ten manuscripts of sailing-directions for the district of the normal-portolano or parts of it, dating from the 15th century, as well as a number of works of the 16th and 17th centuries that fall more or less into the same category. Most of these MSS. are probably the originals or copies of the originals of the printed sailing-directions mentioned below. Since they have never been subjected to any critical examination, I can give no account of them here, but must refer to the list in UZIELLI-AMAT, pp. 205—225. This, however, also mentions works that do not belong to the literature here in question, e. g. nos. 340, 354, 355 (the well known works by Dati, Bordone, and Coppo),

bibliographers state that this little quarto, the first printed work of this kind that is known, was written by the celebrated Venetian explorer Alvise Cadamosto (lived 1432—1480) or by Pietro Coppo of Istria, several of whose works on navigation written at the beginning of the 16th century are still extant; but without doubt it is only a copy in print of some old sailing-direction from the beginning of the 15th century. According to BRUNET (*Manuel de libraire*) the book was reprinted at Venice in 1806, under the title ALOISE CADAMOSTO: *Il portolano del mare, nel quale si dichiara minutamente del sito di tutti i porti, quali sono da Venesca in Levante et in Ponente*. I have not seen this work. One copy, belonging to the K. K. Hofbibliothek at Vienna, is spoken of in H. WAGNER's *Leitfaden*, and a long extract from a copy in the Biblioteca Casanatense at Rome is given in UZIELLI-AMAT (*op. cit.*, II, p. 24). This extract shows that the work does not form a united whole, but is a collection of skippers' notes, that, without any revision, have been copied for practical purposes by the ink and press of the printer.



31. The first pages of a sailing-direction from the beginning of the 16th century. (Original size.)

Qui incomincia lo Libro nominato Portolano
comenzando da venetia andando verso lo leuante
fina in Constantinopoli e in Alefandria e tutta
la Soria cercando le isole del mare stantie
porti vale e colphi dintorno. E prima.

Al nome de Dio e de la sua madre benedetta.

Venetia sie grā ci. per Levante mia. 30.
tade i mar lonzi Santa Chatarina sie porto
da terra da mia. 3 p nauilii piccoli e sie la a.
fina. 4. per tiroco presso a vn mio o piu cha
e deuer ponete circa mio uorle che e citade e sie da
vno eli apiso a mezo mio Liuenza a tanta Chatarina
per grego sie vna isola ch per riuera mia. 8.
a nome muran e la se fa o. E posse andar defora e de
gni lauotero de vedto. Etro per li canali e lidi con
circa vno mio piu de la dabatche e piccoli nauilii.
Muran uetso lo grego sie Da chaurle a Piran guae
do isole lūa se chiama Tor dalle entro Levante e Siro
cello e laltre Mazorbo e co mia. 50.
molti altri luoghi e lidi e Piran sie citade e da porto
canali de acqua falsa p bar e mollo e lo statio sie con
che. E lonzi di Murā mia naue grāde lonzi dal mol
8. per grego sie unaltre iso lo a. 3. prodeci e sie de fon
la che ditte Lio Maggior di de passa. 7. in. 2. e la sie
che a uno porto de fiume fango tenero.
per legni piccoli. Ponta di salbuda nō e poi
Liuenza sie porto dacqua to ma sie buon fondi & a
dolre p legni piccoli e sie serrador per trauerfia erat
da Lio maggior a Liueza dalle Piran con punta de

no. 356 (Gastaldi's Ptolemy) and no. 357 (Sebastian Cabot's map of the world).

B. Printed sailing-directions for the district of the normal-portolano from the 15th and 16th centuries.

Venice 1490. *Questa e una opera necessaria a tutti li naviganti chi vano in diverse parte del mondo per laqual tutti se amaistrano a cognoscere stantie fundi colfi vale porti corsi dacque e maree cominciando de la cita de cadex in spagna dretamente fino nel porto de le schuse passando per icanali fra laixola de ingelterra etc.* Towards the end of the last sheet but one is to be read: *Finito lo libro chiamato portolano composto per uno zentilomo veniciano impresso . . . in la citade de Venexia per Bernardino rizo da novaria stampador 1490 adi 6 novembrio.* Some

Venice, beginning of the 16th century. An anonymous and undated sailing-direction in my collection seems to be of this period. The book consists of 40 unpagged leaves of the size and appearance shown in the above reproductions, which are of the original size. The concluding words run thus: "Finito lo libro chiamato Portolano composto per uno gentilhuomo Venetiano loqual ha veduto tutte queste parte antescritte lequale sono utilissime per tutti i navighanti che voleno securamente navighar con lor navilii in diverse parte del mondo. Laus deo Amen. Stampato in Vineggia per Paulo Danza." Of the same(?) sailing-direction yet another edition was published at Venice, about 1510 by PAULO DANZA. This is recorded on p. 324 of *Bibliographie des livres à figures Vénitiens* par LE DUC DE RIVOLI, Paris 1892.

Venice, circa 1518. A work with the same lengthy title as the preceding, and with the same concluding words, with the exception of the last line which here reads: *Stampata*

in Vinezzia per Domenigo zio et fratelli Vineti. This sailing-direction also has been attributed to Cadamosto and Pietro Coppo, certainly without sufficient reason.

Venice 1544. *Portolano nuovo non piu stampato, molto particolare del Levante et del Ponente, Vinegia per Paulo Gerardo 1544.* (Sale-catalogue of Bibl. Lobris, Munich, Rosenthal 1895, no. 147.)

These sailing-directions are all written in Italian and printed at Venice. In France also a similar work was printed as early as the beginning of the 16th century, with the title: *Le Routier de la mer jusques au fleuve de jourdain . . . Imprimé à Rouen par Jacques le Forestier* (29 leaves, small 8vo, N. D., according to BRUNET).

The language, binding, and print show that such sailing-directions were as a rule intended to be sold to skippers at a low price. But, besides these, similar works were printed with more care and in more select language, in connection with other learned treatises on navigation. Thus a collection of sailing-directions is often found affixed to the Italian translation of the old mediaeval maritime code: *Il consolato del*

ranca of BART. CRESCENTIO also contains, on 63 closely printed and separately numbered pages, a *Portolano della maggior parte de luoghi da stantiar navi, et galee in tutto il Mare Mediterraneo, con le sue traversie & luoghi pericolosi*, Roma 1602 (Imprimatur dated 1599).

The above list includes sailing-directions only for the district of the normal-portolano. There are extant however works of the same kind for the southern parts of the North Sea and the Baltic, from the 15th and perhaps even from the 14th century. These will be treated of later on. The account of the comprehensive and more complete sailing-directions that were printed towards the close of the 16th century in connection with WAGHENAER's *Spiegel der Zeevaert* is also deferred to a following chapter.

I must not close this chapter without directing attention to another work, which has some connection with the charts of the Middle Ages. It has the following title: *Libro del conoscimiento de todos los reynos & tierras & señorios que son por el mundo & de las señales & armas que han cada*



32. Carta marina nova tabula from PTOLEMY, Venetia 1598 and Padua 1621. (Original size.)

mare, editions of which appeared at Venice in 1567, 1599, and 1612. In the last two editions *Il portolano* is bound up with *Il consolato* as a special part, under the title: *Il portolano del mare, nel qual si dichiara minutamente del sito di tutti i porti, quali sono da Venetia in Levante & in Ponente & d'altre cose. In Venetia apresso Lucio Spineda.*¹ The work itself consists of 8 different parts: Portolano di Levante; portolano di diversi luoghi; portolano di Ponente; portolano di Venetia; portolano del Mar Maggiore; portolano di Venetia (bis); portolano di Romania; and portolano del Arcipelago.

A French translation of different sailing-directions for the Mediterranean occurs along with *Le livre du Consulat*, printed at Aix by Pierre le Roux, 1577, while a *Havenwyser* is affixed to BARENTS' *Caertboeck vande Midlandsche Zee*, Amsterdam 1595, the latter being a translation into Dutch by MARTIN EVERART. Finally the *Nautica mediter-*

tierra & señorio por sy & de los reyes & señores que los proueen. In the 55th chapter of PIERRE BONTIERS and JEAN LE VERRIER's description of the conquest of the Canary Islands (MAJOR's edition, *Hakluyt Soc.*, 1872) it is said: "As M. de Bethencourt had a great desire to learn the true state and government of the land of the Saracens and their seaports, which were reported to be good on the main land for twelve leagues towards us to the right of Cape Bojador and the island of Erbanie, where M. de Bethencourt now is, we have here inserted sundry notes on this subject, extracted from a book by a mendicant friar, who made the tour of this country and visited all the seaports, which he mentions by name. He went through all the countries, Christian, Pagan, and Saracen, of those parts, and names them all. He mentions the names of the provinces, and the arms of the kings and princes." This work, mentioned at the beginning of the 15th century, was lost

¹ An edition of this portolano, printed in 1575, is mentioned in HERM. WAGNER's *Leitfaden*.

sight of till 1870, when it was rediscovered by M^{ARCOS} JIMÉNEZ DE LA ESPADA, who published it in *Boletín de la Sociedad geográfica de Madrid*, 1877. It is certainly no account of actual travels, but probably the description of an imaginary journey, compiled with the help of a richly illustrated typical portolano, reports by far-travelled men, and such geographical works as were accessible to the author. Many names here occurring are, however, not to be found on the portolanos of the 14th century. A critical study of these names would therefore be of no little interest. Every city or country spoken

of in the book has a chapter to itself, followed by a representation of the flag or arms of the state. These also seem to have been taken from some portolano. M. JIMÉNEZ DE LA ESPADA has arranged them together on a separate plate, which gives one a good idea of the flags that are to be found on the portolanos, and might offer much of interest to the herald, even if many of the portrayed flags should be only fancy-pictures by a portolan-draughtsman of the 13th or 14th century.

X.

Maps of the coasts and islands of the North Sea, the Baltic, and the Arctic Ocean during the incunabula-period of cartography.

So long ago as the time when the *Periplus of Scylax* was compiled (338—335 B. C., cf. p. 5) much information had been collected, from Phœnician and Carthagian sources, about the part of the Atlantic Ocean near the Pillars of Hercules, while Herodotus had obtained important details concerning the sea around Libya and the adjoining parts of Asia. The Carthaginians moreover, through Himilco's voyage in the middle of the 5th century, had obtained a knowledge at least of the British Isles. But it was through Pytheas the Massilian that the Greeks first gained an acquaintance, based on their own experience, with countries and peoples in the European North.

HERODOTUS (IV: 45) says expressly, that so far as is known, no one has examined if the northern & eastern countries of Europe, *i. e.* Germania and the Middle of Russia are surrounded by water or not. During the whole of antiquity these countries, together with the Scandinavian peninsula, formed the ice-covered desolation of the arctic world, on which a new light was thrown by the voyage of Pytheas. This has a great interest for the historian of navigation, not only on account of the geographical "discoveries" made during it, but also by reason of the numerous geographical and physiographical problems set by it before succeeding centuries. To this it may be added that the journey of Pytheas was the first geographical voyage of exploration sent out by the civilised countries of Europe and the first polar expedition. As such at least it has been regarded for some two thousand years.

The original text unfortunately is lost. We are acquainted with the travels of Pytheas only through scanty abstracts in works by other authors,—Strabo, Pliny, Geminus

and others. Moreover these abstracts are for the most part not taken direct from Pytheas' own descriptions of his travels, but are quotations from quotations. Of the ancient authors that mentioned the voyages of Pytheas, most, on account of the strange things that he relates about the far North, treated his tales as little worthy of belief, a fact that in its turn naturally had a dire influence on the contents and extent of the quotations given. Great uncertainty also attends the attempt to decide the route followed by Pytheas and to identify the countries that he mentions. This is specially the case with Thule, the country furthest to the North. Here, however, I cannot enter upon a closer examination, but must refer to the numerous monographs on Pytheas' voyage of discovery that have been published.¹ As regards the situation of Thule, however, I cannot refrain from pointing out that its identification with Iceland, *e. g.* by BESSELL, evidently results from a want of acquaintance with the conditions of navigation during the far distant time here in question. No voluntary voyage across the open ocean, like that from England to Iceland, appears in the history of navigation before the voyages of the Scandinavians to Iceland and Greenland. Thule was an inhabited country; Iceland, when discovered by the Scandinavians, was still uninhabited, or only inhabited at a few places on the coast by Celtic hermits. Cereals can not be grown in Iceland; in Thule according to Pytheas cereals were grown, and were threshed, not in the open air but in special buildings, as is still customary in Scandinavia. According to Pytheas a drink was brewed from honey in Thule, as formerly in Scandinavia. This implies bee-keeping; but bee-keeping was not practised in Iceland, at least on any large scale. In the face of all this, to identify Thule

¹ FR. AUG. UKERT: *Geographie der Griechen und Römer*, Weimar 1816—1832. Ukert (Theil I, Zweite Abtheil., pp. 298—309) quotes the passages referring to Pytheas in ancient authors.

J. LELEWEL: *Pytheas und die Geographie seiner Zeit*, Leipzig 1838. This otherwise meritorious work contains some maps that are misleading or have misleading headings.

MAXIMILIAN FUHR: *Pytheas aus Massilia*, Darmstadt 1842. The passages in ancient authors where Pytheas is referred to, are quoted on p. 5. Recent authors on Pytheas are quoted on p. 8.

W. BESSELL: *Ueber Pytheas von Massilien und dessen Einfluss auf die Kenntniss der Alten vom Norden Europa's insbesondere Deutschlands*, Göttingen 1858. Bessel's work is written with great acuteness in dialectic; but the results at which he arrives are in many important cases absolutely incorrect, in consequence of the uncertainty of the premises (abstracts from Pytheas' works made by other authors, often at third or fourth hand) from which he proceeds.

GUSTAV HERGT: *Die Nordlandfahrt des Pytheas*, Halle 1893.

BOUGAINVILLE, AZUNI, D'ANVILLE, ANDR. ARV. ARWEDSON and others.

with Iceland, on the ground of an evidently corrupt quotation from Pytheas, incomprehensible in the form in which it has reached us, is absurd.

In determining the situation of Thule, it is safest to start from its position on the only maps of antiquity on which it is marked, namely Ptolemy's map of the world and his *Tabula prima Europae*, both reproduced in my Facsimile-atlas pls I and II. This indicates that Thule should be looked for on the west coast of the Scandinavian peninsula. Probably Pytheas had sailed there, not from north Britain, but along the coasts of the North Sea. On the west coast of Norway he had perhaps met with snow-mist and ice-sludge, and the account of this gave rise at third or fourth hand to the story

century A. D., and finally through the incomplete information about the Cimbrian peninsula and the south coast of the Baltic that resulted from the wars of the first Roman Emperors in Germania. STRABO (VII: 2) expressly denoted the Elbe as the north-east limit of his geographical knowledge, adding that he did not know of any one that had sailed from this river eastward to the mouth of the Caspian, a remark that illustrates the ignorance of classical antiquity concerning the hydrography of North Europe and North Asia. Thus the knowledge of the northern seas possessed by the Greeks and Romans had, at the beginning of our era, reached a standpoint that was hardly extended until vikings from the north began their ravages in the Mediterranean, and until



33. Map of Iceland by FERANDO BERTELI, 1566. (Original size, 0.262 X 0.193 m.)

that Strabo quotes from Polybius, about a place, where there was neither land, nor sea, nor air, but a mixture of all three.

Pytheas lived shortly before Alexander the Great, and therefore shortly before the time when a new light was thrown on the geography of the Indian Ocean and the surrounding countries through the voyage of Nearchus and the military expeditions of Alexander and his successors. Three centuries passed before the Greeks and Romans obtained further knowledge of the seas of northern Europe, through Caesar's conquest of Gallia and the military expeditions of the Romans to Britain, through the discovery of the Orkneys and Agricola's circumnavigation of Britain towards the end of the first

A. E. N. II.

the crusades brought together men of the most different Christian nations in common warfares.

If the mythical tales about India and the country of the Hyperboreans be disregarded, then as is shown by the above account, the geographical knowledge of the cultured nations of Europe during antiquity and the greater part of the Middle Ages hardly reached beyond the limits of the Roman Empire. It is astonishing how exceedingly few attempts were made to extend this knowledge, and what indifference was shown, even at the time of the great migrations, when the inhabitants of the Roman Empire might well have wished to learn something of the countries whence innumerable and often unconquerable hordes of barbarians were poured against them. An exception,

however, was formed by the Arabs, whose conquests and extensive trading journeys brought with them a widened geographical knowledge that soon manifested itself in geographical works, which have been highly, perhaps too highly, praised. But their influence on cartography and especially on marine cartography was, as I have stated before, very unimportant.

Thus, when the normal-portolano was compiled, it comprised all that part of the world known to the Greek and Latin peoples, or rather all that part of the world to which their direct commercial intercourse extended. *Its limits had remained almost unaltered since the time of Pytheas.*

Some centuries earlier, however, there had occurred an event, which forms an epoch, not only in the history of the Scandinavian countries, but also in the history of navigation and, what has hitherto been less noted, in the development of cartography. I mean the discovery of Iceland and Greenland by Scandinavian navigators. This discovery, it is well known, has been a deep influence in the culture of Scandinavian peoples. Its great importance for the history of navigation lies in the fact that it was the first time that sailors, at first storm-driven against their will, afterwards of their own free will, sailed to new lands beyond that Ocean which hitherto had proved an impassable barrier to the westward spreading of the European race. The memory of these discoveries has also been preserved in a rich Scandinavian literature, richer perhaps than the literature of any previous geographical discovery. Moreover the first maps of land and sea beyond the ancient *οὐρανίη* were intended as graphic expositions of these journeys of discovery. They had in this way a direct influence on the development of cartography, and therefore the main points in the expeditions of the Scandinavians to Iceland and Greenland belong also to the history of cartography.

A communication right across the North Sea, between the west coast of Scandinavia and North Scotland, the Orkneys, and the Shetland islands, seems to have existed already at the time of Pytheas. He at least stated (STRABO, I: 4), that the distance from North Britain to Thule was a six days journey in a northerly direction. There is no country at that distance to the north of Britain, but if one sails north-east from the north point of Scotland and with Scylax, whose Periplus was compiled about the time of Pytheas, considers one day and night's sail with favouring wind to equal 1000 stadia, one arrives in six days and nights at the neighbourhood of the polar circle on the west coast of Norway. SOLINUS likewise states that the distance from the Orkneys to Thule is five days and nights' sail. These and various other statements, in classical authors, about islands and countries that surround Britain,¹ hard of comprehension and contradictory in several respects though they are, seem nevertheless to show that so early as the 4th century B. C. men sailed voluntarily or storm-driven from the west coast of Norway to Britain. Accounts of voluntary voyages across the North Sea are, however, to be found first in the Icelandic sagas.²

¹ Cf. FUHR *op. cit.* p. 32 ("Pytheas über Thule").

² According to VIVIEN DE SAINT-MARTIN (*Histoire de la géographie*, Paris 1873, p. 230) Iceland was visited from Norway so early as the beginning of our era. The passage in PLINY that he quotes as evidence for this — "Nerigon ex qua in Thulen navigatur" (*Historia Mundi*, IV: 16) — is, however, only another proof that Iceland in no way represents the Thule of the ancients. On the other hand, if one may believe the Icelandic sagas, the Celts, though perhaps only in small numbers, were settled on the coast of Iceland before the Scandinavian immigration. It is also related that Irish monks, some time before the discovery of the country by Scandinavians, were driven thither by storm and stayed there from February till August. (Cf. LETRONNE: *Recherches sur le livre De mensura orbis terrae par Dicuil*, Paris 1814, pp. 131 and 139, as well as the text Chapter VII, paragraphs 2 and 3). It is probably due to a misunderstanding that the passage in the work by the Irish monk Dicuil, written about 825, where this story occurs, has been referred to Iceland. On the other hand the small islands separated by narrow sounds, so rich in sea-fowl and wild sheep, that are spoken of in Dicuil, Chapter VII, paragraph 3, and which were reached in two days and two nights from the northern islands of Britain with a continuous fair wind, may be referred without straining to the Faeroe Islands. With good reason Dicuil adds about them: "Numquam eas insulas in libris auctorum memoratas invenimus." The distance from the Shetland Islands to the outer rocks of the Faeroe Islands is 150', from port to port of these Islands about 170'. The voyage there with fair wind would thus have been at a speed of 3' to 4' an hour.

³ According to another version of the Landnamabok, Naddod, not Gardar, was the first discoverer of Iceland.

⁴ The recent literature giving a critical account of the contents of these sagas is too extensive even to be recorded here, but as regards the same I beg to refer to the Icelandic TH. THORODDSEN'S *Oversigt over de geografiske Kundskaber om Island før Reformationen* (*Geogr. Tidsskrift*, X, Kjøbenhavn, 1890, pp. 103 *et seq.*).
⁵ Iceland offered at the time of its discovery to the colonist incredibly good opportunities for hunting and fishing, if we may judge from the few descriptions that we have of the animal life in other northern islands that had not been visited by human beings, e. g. Steller's description of the animal life on Bering's island.

In the Landnamabok of Iceland it is related that a man, Gardar, son of the Swede Svavar, possessing landed property in "sjólandi" (Swedish "skärgård", the skerries and fjords of the coast), and born in Sweden, went to the South Islands (the Hebrides) in order to take up the patrimony of his wife (about 865). But as he was sailing through Pentland Firth between the Orkneys and Scotland, he was driven west by storm as far as Iceland. He sailed round the island, wintered there, and returned leaving behind a male and female thrall. The discoverer highly praised the land and called it *Gardars-holm*, which name subsequently was changed into *Snowland*. The discoverer subsequently was changed into *Snowland* by the Norwegian navigator Naddod, who shortly after visited the island.³ Finally the viking Floki Vilgerdsson of the Faeroe Islands gave to the island the name it still has, *Iceland*. How this desert and uninhabited country, sheltered by its remote situation from all disturbers of the peace, and affording splendid opportunities for hunting, fishing, and cattle-breeding, became inhabited from the North within a century, and how it gradually developed into a small civilised state, whose literature during the beginning of the second thousand years of our era was one of the richest in the countries to the North of the Alps, all this is related in the Icelandic Sagas.⁴ On the other hand the descendants of the fearless navigators that settled in Iceland never became a sea-faring people, a natural result of the secure and abundant means of life that the country long offered the settlers,⁵ as well as of the lack of ship-building material.

Some few years after fresh ground had been broken in Iceland, Gunbjörn Ulfsson, according to the Icelandic Sagas, discovered Gunbjörn's Skerry and saw the rocky eastcoast of Greenland. This however was again forgotten, till Eric the Red, a native of Norway, who, with his father, had fled to Iceland because of murder, undertook an expedition about 980, in order to find the country that Gunbjörn saw, when he "was driven westward out on the sea". The reason for this voyage of discovery was that Eric the Red, on account of murders and other outrages, had become outlawed even in Iceland. He landed in Greenland, stayed there two winters, explored the east as well as the west coast of the country and "gave many places name". Thus he too offered an early instance of the name-giving vanity so characteristic of modern explorers. The new country itself he called Greenland, "for a good name would draw people thither". The third summer he returned to Iceland, spent one winter there, and again crossed to Greenland in order to colonize the country. Thirty-five ships set sail the same summer from Breidifjord and Borgarfjord for Greenland, but of these only fourteen arrived, of the rest some turned back and some were wrecked. If Greenland, as is most correct, be counted with America, then this was the first colonizing enterprise to the New World, and it was grand enough if we may believe the accounts of the sagateller. How Greenland subsequently was colonised within one generation, is fully described in the Icelandic sagas.

From Greenland Leif the Lucky, son of Eric the Red, subsequently undertook a voyage of discovery, about the year

1000, to those parts of the great continent of the New World lying to the south, whither several Greenland and Iceland travellers had previously been storm-driven. These American expeditions that started from Greenland, however, never had any influence on the development of either navigation or cartography. Here I may therefore refer to the numerous works that have treated of this subject.¹ I will only remark that, after having visited the east as well as the west coast of Greenland, and having carefully examined the exhaustive literature on this subject, I cannot approve of the ancient chorography of this country now generally accepted (*cf. Antiquarisk Chorographie af Grönland*, in *Grönlands historiske Mindesmerker*, III, Kjöbenhavn 1845, p. 795), according to which the part of the coast of Greenland that was called Eystribygd (East settlements) was situated on the south part of the west coast of Greenland, Vestribygd (West settlements) further north on the same coast, and Brattahlid, the dwelling-place of Eric the Red, in the interior of Igallikofjord; also I greatly doubt whether the ruins and old building-sites, that are found on the west coast of Greenland and have been carefully examined by Danish investigators, belong to the time of the Norse colonists.

The contrary is shown by the following:

1) The precise directions for sailing from Iceland to Greenland that are to be found in the old Icelandic sagas (see below, p. 101). Scanty though they are, they seem to indicate with certainty that the part of Greenland first touched on the voyage from Norway or Iceland was situated directly west of Iceland at a distance of $\frac{4}{7}$ of that from Norway to the south-east point of Iceland. If the Eystribygd of ancient Greenland really was situated on the southern part of the west coast, this would surely have appeared from the above-mentioned sailing-directions, or from other geographical accounts of a somewhat later period, such as are still extant, *e. g.* Ivar Bardsson's description of Greenland in the middle of the 14th century, accompanied by a sailing-direction.

2) In the remains of old dwelling-places that are to be found on the west coast of Greenland, and which have been examined with extreme care and described by several Danish investigators, except for a few unimportant grave-finds outside the ruins, no Scandinavian antiquities have ever been lighted on, though this ought often to have occurred, if the

places really were of Scandinavian origin. These ruins therefore can not be adduced as evidence of the situation of Eystribygd on the west coast of Greenland.

3) The foundation-wall or stone base of these houses, as shown by the careful Danish ground-plans,² has an orientation always according to the *uncorrected compass*, the long side of the house in most cases facing the incorrect south. Even if it be supposed that the compass was introduced in the North simultaneously with its introduction in the Mediterranean countries, the time of its application in Greenland comes long after the time of the ancient Norse colonisation.³

The supposed old Scandinavian building-sites seem therefore to belong to a far later period, probably to a colony of shipwrecked people or pirates, who during the 14th or 15th centuries settled here among the Esquimaux, and finally after some generations were entirely absorbed by the original race of the country. No one, who has studied the very interesting relation between Europeans and Esquimaux in Greenland, will doubt that the same fate would befall the European settlers in modern Greenland, if they were to be completely shut off from their native countries. I consider it far more probable that "Esquimausation" was the fate that befell the old Scandinavian colonists, than that they were exterminated by the "Skrælings". Moreover the theory that Eystribygd of ancient Greenland was situated on the south-west coast did not arise until some ten Danish expeditions, from 1579 to 1787, had tried in vain to force their way from Iceland to the opposite east coast. From this it was concluded that the route was perpetually blocked by ice, and this seemed to be confirmed by seven expeditions during the present century, which suffered either total shipwreck or other disasters of the sea, till in 1883 a Swedish expedition, on the little steamer "Sofia" penetrated thither unhurt, and at one blow broke the chains of prejudice and ice by which the coast had been surrounded for 300 years. Besides, in Ivar Bardsson's instructions for the course, it is expressly said that the east coast of Greenland was formerly more free from ice than in later times. Moreover even under the present conditions of the ice, during the most favourable time of year, it should be easier for such a boat as was in use in the north nine hundred years ago to penetrate from Iceland directly to the east coast of Greenland, than to

¹ Specially GUSTAV STORM's excellent work: *Studier over Vinlandsreiserne, Vinlands Geografi og Etnografi (Aarbøger for Nord. Oldkynd. og Hist. Kjöbenhavn 1887, pp. 293 et seq.)* Storm, however, still accepts the "official" Greenland chorography, according to which Eystribygd was on the south-west coast of Greenland, and he considers that the "Skrælings" whom the Scandinavians met in Vinland, were red Indians, not Esquimaux. On both these points I am of an opposite opinion. When Storm wrote his work, the remarkable maps of Scandinavia, Iceland, and Greenland, mentioned below, and considered by me to be of Scandico-Byzantine origin, were still unknown. According to Professor Storm, Leif Ericsson in 999 sailed from Greenland to Norway; the following spring he returned with a priest to Greenland, but was storm-driven from his course and came to an unknown land, where wheat and grapes grew wild. Hence he returned the same autumn to Eric'sfjord in Greenland. The following year (1001) Leif's brother Thorstein, with his aged father Eric the Red and 20 men, wanted to seek the new country, but they were obliged to return without having reached it. At the Christmas festivities in 1002 there again arose in Eric'sfjord the question of voyages of discovery, and in the spring of 1003 Karlsefni, an Icelander who in the summer of 1002 had come to Greenland, placed himself at the head of a large expedition of 140 men, distributed on three ships, with the intention of finding and colonizing Vinland the Good. After having passed Helluland and Markland, they came to Vinland. Here one of the ships separated from the rest (in 1004), but was storm-driven to Ireland in the attempt to pass a point, Kjalarnes (Keel ness), on the coast of Vinland. The other two went further south in search of a suitable place, where they stayed over the winter of 1004—1005. The Scandinavians came to blows with the inhabitants, and therefore moved to another place, where they passed the following winter. Here the explorers were left in peace, but instead quarrels broke out among themselves for the sake of the women that they had brought with them, and these ended finally with the abandonment of the colonizing enterprise. The two ships returned to Greenland in the summer 1006. No later attempt to colonize Vinland is mentioned in the Icelandic annals. But to conclude from this that voyages to Vinland ended all at once would hardly be right, since such expeditions were scarcely recorded in the annals of Iceland, unless they were accompanied with remarkable mishaps and adventures, or were undertaken by the great men of the island. Successful expeditions of unimportant people were, as is almost always the case, passed by in silence. That the Scandinavians really did settle there is shown by the fact, that a bishop is said to have undertaken a voyage in 1121, probably a missionary expedition, to Vinland, whence he never returned. Probably the Scandinavians at that time were as unable to keep their own language and nationality when they came in contact with a wild hunting people, as they are to day when in contact with Esquimaux.

² Cf. G. F. HOLM: *Beskrivelse af Ruiner i Julianchaabs Distrikt (Meddelelser om Grönland*, VI, Kjöbenhavn 1883) and *Den andra Dicksonska expeditionen till Grönland*, Stockholm 1885, p. 491 and fig. on p. 368.

³ With reference to this question and the importance that the error of the compass has in the cartography of the northern countries, the following table communicated by Dr. V. Carlheim-Gyllensköld may be of interest. Dr. Gyllensköld is at present engaged in a comprehensive work on the secular changes in the declination of the magnetic needle.

The magnetic declination in Greenland, 1538—1829.

A. D.	C. Farewell.	Good Hope.	A. D.	C. Farewell.	Good Hope.
1538	16° W.	30° W.	1730	30° W.	40° W.
1572	11° "	19° "	1770	35° "	45° "
1600	12° "	22° "	1787	40° "	50° "
1642	14° "	20° "	1829	42° "	53° "
1676	18° "	24° "			
1700	32° "	37° "			

On the supposition that the long side of the sites of the houses was laid in the incorrect east and west by compass, then, according to the ground-plans of Holm, the declination at the time of the erection of the houses was about 30°, a number that points to the beginning of the 16th century.

sail from Iceland round Cape Farewell to the supposed Brattahlid in Igalikofjord.

I have dwelt at length upon the expeditions of the Scandinavians to Iceland and Greenland, since it was through them that the existence of a new world beyond the ocean was first brought to the knowledge of the peoples of Europe, and above all because it was through them that the prejudice was dispelled that had hitherto prevented the sailor from venturing on the high seas. Involuntary ocean-voyages had occurred, but this, so far as we know, was the first time that they gave rise to any great geographical discovery or to a regular ocean-navigation far away from the guidance of land. The Icelanders themselves, as I have already said, never became navigators; at least they did not take to ocean-voyages on their own vessels to any great extent. But in the expeditions to Iceland and Greenland men of other nations took part as freebooters and as slaves, and through them the knowledge of the new mode of crossing the ocean was spread far beyond the borders of Scandinavia. Its extension was further aided by the intercourse between the peoples of the north and south that ensued from the voyages of the vikings, from the colonies of the Scandinavians on the coasts of the Mediterranean, and from the employment of Scandinavians as mercenaries in Constantinople.

Long before the re-discovery of America by Columbus, Iceland's richness in fish had caused navigation thither to be extended, with Scandinavians as instructors, to England and the littoral countries of Europe.¹ On Behaim's pre-Columbian globe there is to be read alongside of Iceland: *In der Insel ijsland fehet man den Stockfisch, den man in unser landt bringet*. Columbus too had made an Iceland expedition before he discovered the New World. Independently of the discovery of Vineland by Bjarni Herjulfsson and Leif Ericsson, the voyages of Gardar Svavarsson and Eric the Red therefore form one of the chief epochs in the history of navigation, and apart from the information that Columbus may have gathered in Iceland about a large tract of land situated further away to the south-west, the long, safe voyage across the ocean must have had a notable share in the preparation of the great man for the deed to which he attached his name.

Further, these expeditions were not without their influence on cartography, as is shown by a scrutiny of the maps of the northern countries belonging to the incunabula period of cartography. These may be referred to the following main types:

I. **The Ptolemy type**, based on the account of Pytheas and on statements collected during the military expeditions of the Romans. The Baltic here forms a sea open to the north, in which the island of Scandia is situated. The Cimbrian peninsula is fairly correctly delineated, as also are Ireland, England, & Scotland, except for an enormous promontory that stretches eastward from the north part of Scotland. Still further east is placed the isle of Thule. The Orkneys, too, are marked, and a number of other smaller islands in the neighbourhood of Ireland, England, & Scotland. The map of the world and tabulae prima et quarta Europae in Ptolemy (Facsimile-atlas, pls. I, II, & V) belong to this type.

¹ Our knowledge of pre-Columbian navigation to Iceland is, however, very incomplete. It is chiefly restricted to records in the Icelandic annals of the graver accidents or outrages in connection with the foreign navigation, and of the consequent diplomatic transactions. The most important facts in connection with this are set forth in FINNUR MAGNUSSON'S *Om de Engelskes Handel og Færd paa Island (Nord. Tidskrift for Oldkyndighed, II, Kjöbenhavn 1833, pp. 112 et seq., in Arctic Exploration by Rev. B. F. COSTA (Journ. Amer. geogr. Soc., XII, New York 1880, pp. 159 et seq.), and in TH. THORODDSEN, op. cit.*

² As regards this map, I have to refer to my paper in *Ymer*, Stockholm 1891, pp. 83 et seq., and the above-quoted essay by W. RUGE, pp. 396 et seq. The badly worn copy that I reproduced in *Ymer* was not supplied with any signature, and is supposed by connoisseurs to be a copper-engraving of the 15th century. Ruge, however, who has had access to Borgia's own reproduction of the end of last century, has shown that it is identical with the impression copied in *Ymer*.

³ The Arabian geographer Edrisi was born about 1100 at Ceuta. He studied at Cordova. After extensive journeys in Asia Minor, and Europe, he settled in Sicily, where he occupied an honourable position at the court of Roger II. At the request of Roger, he drew a round map of the world and a "tabula itineraria," reproduced in LELEWEL'S *Géographie du moyen âge*. He also wrote several geographical works, remarkable for their time.

⁴ Here attention may again be directed to the fact that in the history of cartography great confusion has been caused by the ascription of a wrong date to the Arabic portolano preserved in the Ambrosian Library (see above, pp. 46, 47), also by Lelewel's misleading reconstruction of Arabian maps (see above, p. 14).

II. **Atopic maps of the North.** A more or less confused knowledge of the Scandinavian countries soon came with the stream of Scandinavian vikings to the civilized people in the South. The rough robbers of the North were there changed in the second or third generation into feudal lords, fond of luxury, under whose protection even science and literature could sometimes send out fresh shoots. It was natural that the native country of the new rulers should now be better known, and we therefore find a larger space than before allotted to Scandinavia on several of the maps of the world that have come to us from that time. One of the earliest maps of this type is the Anglo-Saxon map of the 10th century, that is preserved in the British Museum, and reproduced by LELEWEL, *op. cit.*, pl. VII. Though extremely confused and deficient, it shows that the map-draughtsman had some knowledge of considerable countries and islands to the north of Germany. The seas of the North are even worse rendered on Haldingham's large map of the world of the 13th century (N. fig. 5), and on similar works of a far later period, e. g. the map of the world of the first half of the 15th century, that belonged to Cardinal Stefano Borgia,² and the map from the 15th century printed in *La Salade nouvellement imprimée*, Paris, 1522 (Facsimile-atlas, fig. 18). The draughtsmen of these maps evidently obtained some information from the far north, but had no experience in cartography. It is otherwise with the maps by Edrisi³ and Sanudo-Vesconte, whose drawing of the Scandinavian countries also belongs to this type. Edrisi's large map of the world has often been quoted in proof of the excellence of Arabian cartography. It is really far better than any other Arabian map known to me, which is not saying much.⁴ But this depends upon the fact that Edrisi's work is a copy of Ptolemy, except for the islands in the Indian Ocean and the northern countries. For the latter the Arabian geographer received new, although, as may be seen from the map, rather confused information at the Norman-Sicilian court where he was staying. As regards this part of the world, therefore, Edrisi's map, with all its imperfection, forms a real step in advance. The Scandinavian countries were somewhat more correctly drawn on Sanudo-Vesconte's map of the world of the beginning of the 14th century, probably in consequence of direct information that Sanudo had collected himself. Scandinavia (Noruega, Scania, Gotia, Suecia, Alandia, Finlandia) here forms a large peninsula, which is connected with the continent only in the north by means of a narrow isthmus. This peninsula forms the western boundary of a large inland sea (the Baltic), with the islands Ossilia and Gotlandia. To the north of the Cimbrian peninsula this sea, the main direction of which is NE. by SW., is connected with the ocean.

III. **The Portolan-maps of the North.** The relatively correct shape that Marino Sanudo gave to the Scandinavian peninsula and the Baltic, was never adopted on the true portolanos. When these maps extend to the countries east and north of the Elbe mouth, the Baltic is drawn as a large inland sea with its main direction from east to west; the Gulf of Bothnia had not yet been discovered. The Baltic is bounded on the north by a country filled with mountains,

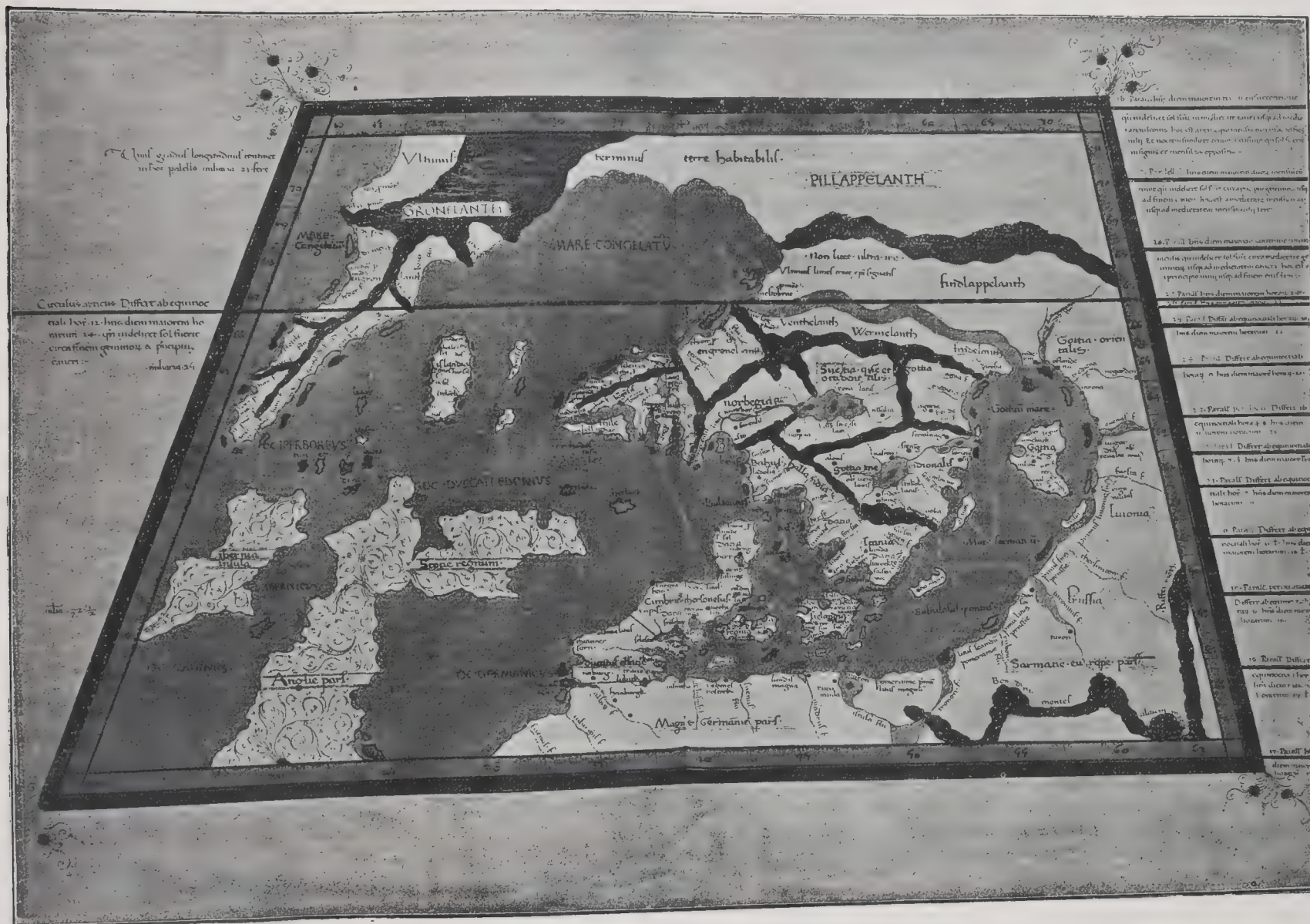
which is often extended as far as the neighbourhood of Scotland. Gotland forms a large island in the Baltic, often coloured with gold and purple, probably to indicate its wealth. The south coast of the Baltic is drawn in straight lines, on which cities and rivers are marked at equal intervals in a manner which clearly shows that the coast was not mapped from direct observation but from hearsay. See for example N. T. VIII, IX, XI, and XII.

Also on the map of Germany and South Scandinavia by NICOLAUS A CUSA, printed in Eichstädt in 1491, the Baltic is rendered in the same way. This map is reproduced here on pl. XXXV. The long inscription runs as follows:

Quod picta est parva germania tota tabella
Et latus italię gelidas quod prospicit alpes
Sauromatumque truces populi gentesque profundo
Vienę adriaco: pelopis regnumque vetusti

in *Bidrag till Nordens äldsta kartografi*, Stockholm 1892. Compare also the English edition of the Facsimile-atlas, Adenda p. 135. The map shows how exceedingly deficient was the conception of the Baltic, the North Sea, and the Scandinavian peninsula, that obtained towards the close of the 15th century in the south and middle of Europe.

I suppose that the drawing of the North on the portolanos is based on the information and drawings gathered by Mediterranean skippers in the ports of Flanders, where the goods of the Hanseatic towns were exchanged with those of Spain and Italy. This trade is said to have begun in the year 1262. The trading voyages of England on the Baltic first began in 1310 (ANDERSON: *An historical and chronological deduction of the origin of commerce*, I, London 1787, pp. 225, 278). Towards the end of the 13th century the incorrect representation of the coast-lines between the Elbe



34. Map of Scandinavia and Greenland from a Ptolemy MS. of the 15th century in the Laurentian library. (Reduced to 0.43.)

Pannonios et tendit agros qua frigidus hister
Atque licaonios terrarum quicquid in axes
Vergit et equoreas rhodanus qua verberat undas
Et multę punctis urbes villeque notatę
Gracia sit Cuse Nicolao: murice quondam
Qui tyrio contextus erat splendorque senatus
Ingens romani: nulli explorata priorum
Et loca qui modico cęlari iussit in ere.
Eystat anno salutis 1491, XII kalendis augusti perfectum.

The original, which belonged to Pirkheimer and is now preserved in the British Museum, was richly coloured and partly gilt. The map has previously been reproduced by S. RUGE: *Ein Jubiläum der deutschen Kartographie* (Globus, LX, 1891, pp. 4—8) from a photograph supplied by me, also A. E. N. II.

and Gibraltar which occurs on the oldest known portolano (Carte pisane) was considerably completed and improved. There are also several trustworthy statements of that date concerning the arrival of trading-vessels from the Mediterranean at the ports of the Channel. Here are some examples chiefly taken from E. T. HAMY's article: *Les origines de la cartographie de l'Europe septentrionale* (Bull. de géogr. historique et descriptive, Paris 1888, pp. 333 et seq.).

1294. King Dionysius of Portugal writes a letter urging king Edward I of England to make peace with the king of Castille, since not only were the combatant nations suffering from this naval war but also others that were trading with England or Spain (RYMER: *Fœdera*, vol. I, part II, London 1816, p. 815).

B. Maps on which Greenland is placed not west but north of Scandinavia.

The identity of the rather curious legends denotes that both these types had a common origin. *A* is the primitive type itself; *B* arose after the introduction of the compass in the North, but before its considerable deviation in the Arctic regions was recognised, by *A* being corrected so that Greenland was placed with regard to Scandinavia in about the position indicated by the compass-needle on the coast of Greenland. A correct map was by these means *corrected* to a totally incorrect one. (Cf. the diagrams in the Facsimile-atlas, figg. 33—36.)

When I published my Facsimile-atlas, besides the maps which, with considerably altered legends, were published in print from 1482 to the beginning of the 17th century, there were known only two older hand-drawn works of this kind,

library at Warsaw and further described in the Facsimile-atlas, p. 55. The map itself is there reproduced in full size on pl. XXX. The MS. ends thus: "Laus deo Virginisque matris Marie; Nobilium numero scriptorum antonius unus Stirpe vitellensis scripsit me a vertice ad imum."

2) A map that completely corresponds with the previous one and is to be found in a Latin MS. of Ptolemy's geography of the 15th century, preserved in the Laurentian library at Florence (Plut. XXX, Cod. 3). The map which, like the previous one, is drawn on "Donis" projection, is here reproduced in fig. 34.

3) A map, corresponding with the previous ones, so far as the shape of the North is concerned, but drawn not on Donis' projection but on the equidistant projection of Marinus, and extending, as shown by fig. 35, further to the



35. Map of Scandinavia and Greenland from a Ptolemy MS. of the 15th century in the National Library at Florence. (Orig. size 0.505 x 0.345 m.)

namely, a map that I had discovered shortly before in the Zamoisky library in Warsaw and a map at Brussels. Since then three similar maps have been found at Florence, where they were first observed by Professor F. R. VON WIESER of Innsbruck (*Petermanns Mittheilungen* 1890, p. 276). These maps, in the manuscript form in which they now appear, supply us with such important details concerning the oldest maps of the Scandinavian peninsula, Iceland, and Greenland, that their discovery is one of the most important contributions recently made to the history of cartography.

At present the following five documents of this kind are known:

1) A map of type *A*, appended to a magnificent Latin MS. of Ptolemy of about 1470, belonging to the Zamoisky

South than these. This map also is appended to a Latin MS. of Ptolemy's Geography (Jacobo Angelo interprete) of the 15th century, preserved in the National Library (Cod. Magliabechiano, Cl. XIII, No. 16) at Florence. This codex of Ptolemy is, according to the description of Signor ENRICO NARDUCCI (*Studi bibliografici e biografici sulla storia della geografia in Italia*, Roma 1875), one of the most splendid works in this library. Its plates were executed by Henricus Martellus Germanus, probably a German miniature-painter working at Rome during the later part of the 15th century, but certainly no cosmographer. The text begins with a dedication to "Beatissimo patri Alexandro quinto Pont. Max. Angelus". The MS. contains 38 geographical maps, that is to say 11 "tabulae modernae" in addition to the ordinary

27 Ptolemaic ones. Unfortunately the former are not even enumerated in Narducci's description, but there is no doubt that they form, as do nearly all "tabulae modernae" in MSS. of Ptolemy, the part of the document that is most important for the history of geography, more important than all the finery, which may also be found in several other MSS. of the 15th century. Narducci's description at all events warrants the conclusion that the last untitled map must be a portolano and that the first "Descriptio orbis Pii secundi pontificis maximi" probably bears a close resemblance to the planisphere drawn by Henricus Martellus that is preserved at the British museum. The MS. belonged to the celebrated condottiere Camillo Maria Vitelli, whose initials are set at various places on the cover. On the back is written: "Cl. Ptolemei cosmographia cum tabulis regionum nostri temporis et universis portubus et locis maritimi tractus tam notis quam a rege Portugalli nuper repertis, hoc ornatissimo codice continentur."

4) A map on Donis' projection, similar to nos. 1 and 2, but with some important legends wanting on those. It occurs in a work written about 1420: *Descriptio Cicladum aliarumque insularum* by CHRIST. EUSENIUS (Buondelmonte). The MS., which is of the end of the 15th century, is preserved in the Laurentian Library at Florence (Plut. XXIX, Cod. 25, sec. XV). The map is here reproduced on pl. XXXII. Some remarks, unfortunately very incomplete, on the codex in which this map is inserted, are given by ASSUNTO MORI in *La Groenlandia in due carte del XV secolo*, Firenze 1895.

The maps nos. 2—4 are reproduced in phototype in *Bidrag till Nordens äldsta kartografi*, Stockholm 1892.

5) A map of the North of type B, which occurs in a Latin Ptolemy-codex written between 1480 and 1485, and preserved in the Royal Library at Brussels. It was published in facsimile by CH. RUELENS in *Les monuments de la géographie des bibliothèques de Belgique. Cartes de l'Europe 1480—1485*, Bruxelles (1887). In the Facsimile-atlas, fig. 35, it is also reproduced on a greatly reduced scale.

The map-type A, with Greenland in its correct position with regard to Scandinavia, as well as the map-type B, with Greenland placed almost north of Scandinavia, have often been published in print: A for the first time in the description of the journey of the Zenos, printed at Marcolini's, Venice 1558, and subsequently as *tabula nova septentrionis* in the Ptolemy editions of 1561, 1562, 1564, 1574, 1596, 1597, 1598 (two editions), 1599, 1608, 1617, 1621, also in Mercator's great atlas; the maps of type B in the Ptolemy-editions of 1482, 1486, 1507, 1508, 1513, 1520, 1522, 1525, 1535, and others. This by no means exhaustive list shows how important these maps were for the South's knowledge of northern lands during the centuries in which Europeans first circumnavigated Africa and discovered the countries of the New World. All these printed maps, however, deviate so considerably from the MS. originals that have been discovered of late years¹ that not till now could one attempt with any certainty to decide when and where the ancient *οἰκουμένη* first received this considerable extension. Since no inscription on the maps gives any answer to this question, those who wish to settle it must have recourse to an examination of the legends, of which a comparative list is therefore given here.

Coast-legends in the Scandico-Byzantine maps of the North.

Ptolemy-codex in the Zamoisky- Library.	Ptolemy-codex in the Laurentian Library.	Buondelmonte-codex in the Laurentian Library.	Ptolemy-codex in the National Library, Florence.
amasus flu. uisurgus f. albis f. hanburgk naburg thitumesorn	suenus f. uisurgus f. albis f. hanburgk naburg thitumesorn olsatie litus	suenus f. visurgus fl. albis flus hanburg thitumesorn olsatie litus frigie litus rupis burgrauen	hamburg thitumesorn
frigie litus rupis burgrafen	rupis burgrafen hedre litus	salinge hert lim . . susel	
salinge hert	salinge hert	uende susel scanen promont. viberg arus caldinge uilla uechelil uilla oberon uilla also p. finsebor(?) sclesta igerne fier ploena chorl trauen lubick uismaria calusius f. rostock rebenes suenus flu. lund magna uiadrus f. rura insula 3. istula f.	ande susel scauen promont. viberg aris caldinge uilla vhelis uilla oberon uilla also promont. frenseber sclefenie iger . . fier ploen lubick calusius fluvius suanus fluvius nuarus(?) f. istula fluvius sive odra
uinde susel scauen pro. uiberg arus caldinge uechelil uilla oberon uilla also p. finsebor(?) sclesta igerne fier ploena chorl trauen lubick uismaria calusius f. rostock rebenes suenus flu. lund magna uiadrus f. rura insula 3. istula f.	uinde susel scauen pro. uiberg arus caldinge uilla uechelil oberon uilla also p. frensebor sclesta igerne fier ploena chorl trauen lubick uismaria calusius f. rostock rebenes suenus flu. lund magna uiadrus f. rura insula istula flu.	uinde susel scanen promont. viberg arus caldige uilla vechelil uilla frenseber uilla sclefenie igerne fier ploen choli trauen lubick uismaria rostock rebenes suenus f. lund magna viadrus f. rura insula istula fl.	
1. ruron pomeranie primum litus magnum f. tronon pomeranie 2m litus rubon f. primum prussie litus dansor thuron turon flu. primus prussie si- nus chersimton f. primus liuonie si- nus riga furstia f. ³ reualea ciuitas ungardia auenas flu. ³ uirona trodienna ³ offlandia fierdis flu. ³ roderin arosia 2. agna f. 1. trediera f.	1. ruron pomeranie primum litus magnum tronon f. litus secundum po- meranie rubon flu. primum litus prus- sie dansor turon turonit f. primus sinus prus- sie chersimton f. primus liuonie si- nus riga ciuitas furstia f. reualea ciuitas ungardia auenas f. uirona trediena f. offlandena fierdis flu. roderin arosia agna f. trediera f.	1. ruron pomerie primum litus magnum tronon f. litus secundus(l) pomeranie rubon flu. primum litus prus- sie dansor turon turon fl. primus sinus prus- sie ser . . . primus liuonie si- nus riga furstia reuall[?] ciuita[s] ungardia aue . . . fl. virona trediena fl. offlandena fierde fl. roderin arosia angue fl. trediera f.	pomeria dansor turon sensor fluvius riga fusta fluvius reuale civitas auenus fluvius virona trodienna fluvius offlandena fierde fluvius roderim arosi

¹ This account of Narducci's description was kindly communicated by Mr. D. Chilovi, Librarian at Florence.

² Just those legends that are of importance for proving the northern origin of the maps are omitted on the printed maps.

³ These names, which occur in several places on manuscript maps of this type, are pure Scandinavian = first, second, third, fourth (*första, andra, tredje, fjärde* in modern Swedish).

<i>Ptolemy-codex in the Zamoisky- Library.</i>	<i>Ptolemy-codex in the Laurentian Library.</i>	<i>Buondelmonte-codex in the Laurentian Library.</i>	<i>Ptolemy-codex in the National Library, Florence.</i>
fierdena f. stacalnaga	fierdena f. stocalnaga	fierdena f. stokalm . mangna	stokalm ciuitas magna
soriensis calmam	soriensis calmaur	soriensis calmaura	soriensis 2. calmaru
seta f.	seta flu.	seta f.	1. seta fluuius
aosia	aosia	aosia	aosia
dapnorum pro.	dapnorum prom.	danor . . promont.	danorum promont.
fursta f.	fursta f.	fursta f.	
agnen f.	agnen f.	agnen f.	
istrude	istrude uilla	istrude uilla	istrude villa
falsterbede	falsterbede	falsterbede	falsterbede
scanoch	scanock	scanock	scanok
			agus fluuius
elcebrogen	elcebrogen	elcebrogen	elebrogen uilla
erici por.	erici p.	erici p.	erici portus
elsibors	elsibors	elsibors	elsibors
forsta f.	forsta f.	forsim f.	
anga f.			
cunutis	cunutis	cunut . .	cunutis
orot	orot	ort	orot
forst f.	forst	forst f.	
anga f.	anga f.	anga f.	
trodia f.			
sumersan f.	sumors . . f.	sumorsa fl.	
ladasia	ladasia	ladasia	ledasia
		bahus	
finstar f.	snistar(?) f.	finstar fl.	
asto	asto	asto	asto(?)
farensis	farensis	forensis	farensis
yona f.	yona flu .	vorie fl.	
litus tumebor	litus tumebor		
amerensis litus	amgrensis	amorenis litus	amerensis(?)
optena	optena f.		.....
unta f.	unta f.		.....
repuris	repuris	repur . .	.....
	grandia		
luste pro.	luste pro.	luste	liste promont.
stauangerensis	stauangerensis	stauangerensis	stauangerensis
burn f.	burn f.	2. burn f.	
bergensis	bergensis	1. bergensis	bergensis(?)
archius f.	archius f.	archius fl.	
nodrosia	nodrosia	nodrosia	nodrosia
		ici fl.	
optea promont.	optena promont.	optea promont.	opteam promont.
uictu f.	uictu f.	victu f.	
uultu pro.	uultu pro.	uultu promont.	uultu promont.
seche f.	seche f.	seche p.	
seletros promont.	seletros pro.	seletros promont.	seletros promont.
trog	trogera f.	trogere fl.	
tometer pro.	tomente pro.	tometer promont.	tometer promont.
termor f.	termor f.	termor f.	termor fl.
thion f.			
thion pro.	thion pro.		tiem promontorium
enog f.	enog flu.	enog fl.	
iursech pro.	iurseg promont	tuesch promont.	.. esech promon- torum
promont. mesto- broth	mestobrat pro- mont.	mestobrat promon- torum.	mestebrot promon- torum
<i>Greenland.</i>			
ther promont.	ther prom.	ther promont. ²	ther promont.
boger f.	boier flu.	boier f. ¹	beuer fluuius
hien pro.	hien p.	hien promont.	hien promont.
naf fl.	naf f.	2. naf fl.	naf fluuius
yhi promont. ³	ygi promont. ³	3. yc promont. ²	vyi promont ²
lande ³	lade f. ³	1. lade f. ³	laude fluuius ³

¹ Occurs in two instances.
² Evidently a different way of writing *is promontorium* (= promontorium glaciale).
³ If this name be written together with *munder* (see just below), one gets the only name in these maps that is also found in the Icelandic sagas.
⁴ *Bäda* is a name common on modern charts of the Scandinavian countries, for rocks situated at the edge of the open sea; *spik* or *späck* is easily recognised as a Northern word.
A. E. N. II.

<i>Ptolemy-codex in the Zamoisky- Library.</i>	<i>Ptolemy-codex in the Laurentian Library.</i>	<i>Buondelmonte-codex in the Laurentian Library.</i>	<i>Ptolemy-codex in the National Library, Florence.</i>
spichbod f. ⁴	spichbod f. ⁴		spic fluuius
munder	munder p.	munder promont.	munderh pro.
han fl.	han f.		han fluuius
trui pro.	trui promont.	ce . . promont.	ceum promont.
aner f.	aner f.	aner	ouer promont.
		ana fl.	ana fl.
af pro.	af promont.	af promont.	aff promont.
nice f.	nice f.	nice fl.	nice fluuius.
hoen pro.	hoen p.	hoen promont.	hoen promont.
han f.	han f.	han fl.	hair fluuius
oaner promont.	oaner p.	oaner promont.	oaner promont.
flescle f.	flescle flu.	fleschle fl.	flescle fluuius.
hic promont.	hic promont.	hic promont.	huc promont.
feder fl.	feder f.	feder fl.	
nurdum pro.	nurdum promont.	nudrum promont.	2. nurdum promon- torum
driuer f.	driuer f.	driuer fl.	1. driuer fluuius
sadi pro.	sadi promont.	sadi promont. ²	
nha promontorium	nha promont.	na promont.	naa promontorium
neum promont., ul- timus terminus	neum promont.	neum promont., ul- timus terre ter- minus.	neum promonto- rium, ultimus terre terminus.
terre habitabi- lis.			

From the above list of names the following conclusions may be drawn:

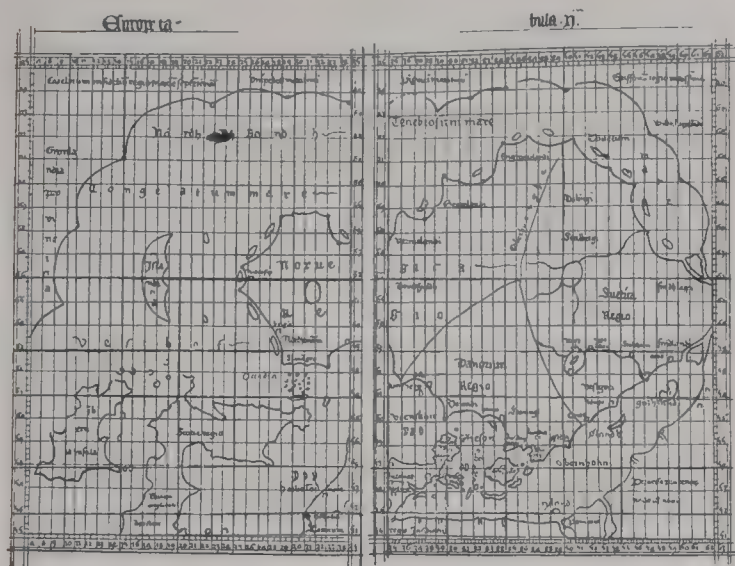
- 1) All these maps are revisions of the same original.
- 2) The original from which these maps, with some few additions, are copied dates from the end of the 13th century or the beginning of the 14th. The wonderfully correct drawing of Greenland must date from a time when there was still constant communication between Greenland and Scandinavia, before the Greenland colonies, at first so vigorous, began to dwindle, either because of attacks by the natives, which supposition I consider little likely, or, as seems more probable, because of the increase of the ice along the coasts and the decrease of game inland. The inscription on the north-east corner of the map (4) found in Buondelmonte's work runs thus: "Norvegia et livonia patrie paludoxe ut vix estate permeari possit livonia noviter per prutenos fratres ad christi fidem conversa se extendit ad boream." The conversion of Livland (Livonia) was completed in the middle of the 13th century. The above legend would thus indicate that this map was drawn during the latter half of the 13th century or the beginning of the 14th. The name *Gazara*, by which the Crimea is designated on map 3, also points to a great age. For that country, having been conquered by the Kazars during the 7th century, was called *Gazaria*, even after their empire had been destroyed at the beginning of the 11th century. The same name also occurs in the Catalan Atlas of 1375.
- 3) The maps are based on northern documents, drawn or written. For the legends, as Dr. Dahlgren was the first to point out, are partly written in a northern tongue, *e. g.* *fursta*, *auenas*, *trodiena*, *fierdis* (= *första*, *andra*, *tredje*, *fjärde*) *fluuius* or *promontorium*. On the Scandinavian peninsula itself and on Denmark many legends are easily identified with names still in use or known in history, *e. g.* *sce-ning*, *ussalia*, *stokalm*, *uisbu*, *bornholm*, *bergensis*, *nodrosia*, *hanburgk*, *lubick*, etc. Much more difficult to explain are most of the names that occur on the coast of Greenland.

They are quite different from the names in the Northern sagas, and yet these old northern maps of Greenland, whether it be from actual observation or from mere chance, are more correct than all known maps of the Scandinavian peninsula and England down to the middle of the 16th century.

4) These documents have been put together by a scholar, with a good knowledge of mathematical geography, and well acquainted with Ptolemy's atlas. This is proved by the maps being carefully graduated and divided into climates according to a Ptolemaic pattern, by the Ptolemaic style in which they are drawn throughout, and by the Ptolemaic shape given to countries other than Scandinavia, *e. g.* the projection from the north coast of Scotland.

5) On the other hand, the drawing of Britain and the Crimea shows that the author was not acquainted with the portolanos, while the repetition of the northern legends in their original language proves that he was not acquainted with Scandinavian tongues or he would certainly instead of *fursta*, *auenas*, *trodiena*, *fierdis* have used *primus*, *secundus*, *tertius*, *quartus*, also *promontorium glaciale* instead of *yc promontorium* on the east coast of Greenland.

6) The maps are probably of Scandico-Byzantine origin. Four of the copies or translations at present known are



36. Map of the North by CLAUDIUS CLAVUS, 1427. (Reduced to 1/2.)

appended to Latin MSS. of Ptolemy's Geography. Hence the obvious hypothesis that the original belonged to a Greek codex of this author taken to Italy at the beginning of the 15th century, a supposition which is further confirmed by the fact that the fifth copy was found in a work by Buon-delmonte, who had long been staying on the islands of the Archipelago, in order, it is said, to collect Greek manuscripts. I therefore suppose that we have here a Latin translation, the Greek original of which was drawn at Constantinople, and based on statements by some of the far-travelled Norsemen whom the Byzantine emperors had in their pay. Several mercenaries, perhaps Harald Hardradi himself, had made voyages to Iceland and Greenland before they entered the service of the emperor. In the cartographic description of the Northern countries composed by Claudius Clavus at the beginning of the 15th century, but based in many respects on older works, the following sentence occurs: "Sumershaun insula in qua sanctus Olaus rex et martyr debellabat fratrem suum infidelem visibili adiutorio domini quod oculis vidisse favet (o: juvat)." Clavus has here introduced, without any alteration, a sentence, which, if it be taken literally, must have been derived from an author who fought in the ranks of St. Olof, *i. e.* who lived in the

11th century. I hope that the Greek original of these Scandico-Byzantine maps may be found, when the numerous extant greek manuscripts of Ptolemy's geography shall have been duly examined, especially with regard to the new non-Ptolemaic maps that occur in them.

V. Claudius Clavus' map of 1427.

There is further an ancient map of the countries and seas north of Germania, founded on Norse sources, *i. e.* the map of the North by Claudius Clavus or Clavius. It is, together with an exhaustive description, inserted in a small Latin MS. of Ptolemy's Geography, written on parchment and completed in 1427. This MS., which was executed in Italy by order of Cardinal Filiastus (died 1428), is now kept in the town-library of Nancy, whence it has kindly been put at the disposal of several workers on the geography of the North. For the map is of as great interest for the old geography of the North as for the history of cartography. It is the earliest signed and dated map of the Scandinavian countries at present known. Several geographical latitudes seem to have been calculated for this map from the length of Midsummer-day. It is the first dated non-Ptolemaic map divided into degrees of latitude and longitude, and the first map on which the geographical coordinates are marked in degrees and minutes, not in degrees and parts thereof (*e. g.* $45^{\circ} 30'$, not $45^{\circ} 1/2$), a practical improvement on the old Ptolemaic way of reckoning which Sebastian Münster, in 1540, claimed to have introduced. Further the map of Claudius Clavus has a double graduation, showing that the map, or rather the large-scale original, of which only a greatly reduced copy is extant, was used as a chart, and that the sailors who used it noted the difference, when at higher parallels, between the true course and the course as laid down on a map on the equidistant projection of Marinus. For further information I must refer to the meritorious monograph by JEAN BLAU in *Mémoires de la Soc. royale des sciences . . . de Nancy*, 1835, to a paper by G. WAITZ in *Nordalbingische Studien*, 1844, to my paper *Om bröderna Zenos resor och de äldsta kartor öfver Norden* (published in *Studier och forskningar, föranledda af mina resor i höga Norden*, Stockholm 1883), to the Facsimile-atlas, p. 54, also to the somewhat uncritical information about the author given in E. ERSLEV's *Fylldand*, Kjöbenhavn 1886, and to the exhaustive monographic description of the work of Claudius Clavus given by Professor GUSTAV STORM (*Den Danske Geograf Claudius Clavus eller Nicolaus Niger in Ymer*, Stockholm 1889 and 1891). A coloured reproduction of the map is given in my work as well as in that of professor Storm.

In one respect, however, I have to oppose the results arrived at by the excellent and acute investigator just mentioned, namely, his supposition that the maps of the North described above as Scandico-Byzantine were composed by Claudius Clavus, and that the small map signed by Claudius Clavus in the MS. of Filiastus is a somewhat altered copy of them. This is quite impossible. Plate IV and the comparative list of legends on pp. 25—44 show with what great care maps were copied during the Middle Ages. On the map by Claudius Clavus on the contrary, the shape of the countries is absolutely different from that on the Scandico-Byzantine maps (see figg. 34—36). Both these map-types are graduated in latitude as well as longitude after the Ptolemaic pattern. But the latitudes and longitudes that occur on the map by Claudius Clavus or are denoted in his map-description differ, as shown by the table below, completely from the latitudes and longitudes used on the rest of the maps of the North here in question, which latter are in fair mutual agreement.

	Ptolemy, National Library.		Ptolemy, Lau- rentian Library.		The text in Clau- dius Clavus. ¹	
	Lat.	Long.	Lat.	Long.	Lat.	Long.
Hamburg	56°	33°	55° 1/2	33°	—	—
Ribe	—	—	59°	35°	56° 50'	32°
N. point of Jutland . . .	60° 1/4	40° 1/2	60° 1/4	41°	59°	40°
Lübeck	56°	36°	56°	34° 1/2	—	—
Rügen	—	—	—	—	—	—
Riga	61°	61°	60° 1/2	60° 1/2	—	—
Reval	62° 1/4	62° 1/2	62° 1/4	62°	—	—
Stockholm	62° 1/3	53°	62° 1/2	53°	—	—
Visby	62°	57° 3/4	61° 3/4	57° 1/2	61°	59°
Skänör	58° 3/4	47° 1/2	58° 2/3	47°	58° 20'	47° 10'
Stavanger	63° 1/8	34° 1/3	63° 1/4	35°	62° 30'	29°
Bergen	63° 1/2	32° 3/4	63° 1/2	33° 1/3	64°	29°
Trondhjem	63° 1/3	29° 1/2	63° 1/8	29° 1/2	66°	26°
N. point of Iceland . . .	65° 3/4	22° 1/4	65° 1/2	22° 1/2	67° 50'	19° 10'
S. point of Iceland . . .	63° 1/4	22° 1/3	63° 1/2	22° 1/2	64° 10'	19°
S. point of Greenland . .	62° 7/8	9° 1/2	62° 3/4	10° 1/3	63° 15'	7°

that which Clavus is supposed to have been guilty of in reproducing his own work. This therefore cannot be a work by the same geographer, as professor Storm and other authors have tried to prove. The unmistakable resemblance in some legends is explained by the fact that the map ordered by Filiastus was compiled by Clavus in Italy, probably not from maps brought there from the North, but from his own experience and the documents relating to the geography of the North that were available in that country. The most important and most exhaustive of these seems to have been the map, as I believe originally written in Greek, of which the maps in the Zamoisky Library and in Florence seem to be translations, perhaps with some additional data for the Danish isles. The not very flattering descriptions of the neighbouring nations on the map of Clavus — "Britani anglicati apostate," "Carelorum infidelium regio maxime septentrionalis," "Perversa prutenorum nacio vel nocio," "Slavorum regio insidiatrix" — also suggest that part of his map was drawn from a source dating from the end of the 13th cen-



37. Map of Iceland in MERCATOR'S Atlas, 1595. (Orig. size 0.433 x 0.278 in.)

While the differences between the first two double columns evidently only depend on carelessness in copying, the differences between these two and the third are too great to be thus explained.

The same result follows from a comparison of the legends on the Scandico-Byzantine maps, first with one another and then with those on the map of Claudius Clavus. As a Dane, Clavus was well acquainted with the Scandinavian languages. The compiler of the Scandico-Byzantine maps, on the contrary, could not reckon even so far as "one" in those languages (Cf. the previous page). The difference that arose in copying the portolanos and in repeated translation to perhaps the 20th or 30th degree during three centuries (see the tables above pp. 25—44) is not nearly so great as

tury or the beginning of the 14th. The identification by Professor Storm of *Careli* on Clavus' map with the Greenland word *Kardlit*, never, so far as is known, used by the Scandinavians, is also rather strained.

VI. Ruysch's *Universalior cogniti orbis tabula ex recentibus confecta observationibus*, engraved on copper and published in PTOLEMAEUS, Romae 1507—1508. Further details about this map are given on p. 63 of my Facsimile-atlas, where it is reproduced on pl. XXXII. For the cartography of the North this map is of interest on account of the fantastic shape of the Scandinavian peninsula and the extraordinary drawing of the district round the pole, subsequently approved of even by Mercator (Mercator's polar map is reproduced in the Facsimile-atlas, fig. 60).

¹ These longitudes and latitudes that occur in the text correspond with the longitudes and latitudes on the left side of the map. The latitudes on the right side of the doubly graduated map are 4° lower.

VII. A map published in Ziegler's *Quae intus continentur* etc.,¹ Argentorati 1532, reproduced in the Facsimile-atlas, fig. 31. As I have pointed out in that work, this map shows that the learned theologian who published it, though exceedingly ignorant of the art of map-drawing, had access, as stated in the work itself, to good original information from the North. The town of Birka (Pircho) long before destroyed, Åland, Pajänä (Pevnthe), Korsholm, Åbo, and other places are here marked for the first time.

VIII. Olaus Magnus' large *Carta marina et descriptio septentrionalium terrarum* etc., printed in Venice on 9 large folio-sheets joined in one, together occupying a surface of 1.70 × 1.25 m. For further bibliographical data I must refer to the Facsimile-atlas, p. 60. Here I will only recall the fact that this map, not only in size, but in its abundance of geographical and ethnographical details, is without a peer among works of similar nature till then published in print.² Probably it was once distributed in a number of copies, which, however, as is often the case with loose maps of very large dimensions, have all been lost, except one, which came to light some years ago in the library at Munich. Dr. OSCAR BRENNER (*Die ächte Karte des Olaus Magnus vom Jahre 1539*, in *Christiania Videnskabs-Selskabs Forhandlinger*, 1886) having drawn attention to this, and published a facsimile on a very diminished scale with descriptive text, the nine remarkable map-sheets were reproduced by heliogravure in full size for several bibliographers and public libraries in Sweden. Moreover so early as 1572 there was published an exact copy of this map, reduced to about half its size, engraved on copper in a masterly Italian style; this is reproduced on a still smaller scale in the Facsimile-atlas, fig. 32. Finally the works and activity of Olaus Magnus have recently formed the subject of a detailed and exhaustive monograph by KARL AHLENIUS: *Olaus Magnus och hans framställning af Nordens geografi*, Upsala 1895.

This map by Olaus Magnus, which must not be confused with the maps in the different editions of *De gentibus septentrionalibus*, is of great importance, not merely from an ethnographical but also from a geographical standpoint. For it was the map of Olaus Magnus that first taught men the true shape of the Baltic with the Gulfs of Finland and of Riga. Even the condition of the Baltic ice in winter is correctly given and in a style of drawing which perhaps deserved to be adopted again. On the other hand the drawing of Iceland and Greenland is far inferior to that of the Scandico-Byzantine maps. At the time of Olaus Magnus the communication between Iceland and the Scandinavian peninsula was not very brisk; Greenland was nearly forgotten.

Remarkable also is the name, *Carta marina*, which Olaus himself gave to his work, as well as the loxodrome-lines traversing the map, with compass-roses at their points of intersection. These details seem to me to show that Olaus Magnus based his contour of land and sea in the first place on a skipper-chart of the Northern seas now lost. This he subsequently filled in from the knowledge of geography, ethnography, and natural history possessed by himself and his northern contemporaries. Moreover the map is furnished with geographical coordinates. But these, I presume by reason of the patriotic prelate's ignorance of mathematical geography, are quite incorrectly drawn up—far more so than those on the Scandico-Byzantine maps.

After the discovery of Iceland and its colonization during the 9th century, there sprang up a brisk trade between that island and the Scandinavian countries. Later on, however, perhaps first during the 15th century, the coasts of Iceland were visited for the purchase of fish and wool by vessels from England and possibly also from Germany, France, and Spain. The island is recognised, under the name of *Reslanda*, in *Tabula itineraria Edriciana* (apud Lelewel) as an enormous land situated to the north of the North Sea and of Scotland. It is also placed, with fair correctness, in the North Atlantic Ocean on Claudius Clavus' map of 1427, as well as on the Scandico-Byzantine maps and on the reproductions of them which were inserted in various editions of Ptolemy from 1482 onwards. Iceland is marked, although to the north-east or north of Norway, also on the maps of the world in some of the MSS. of MARINO SANUDO'S *Secreta fidelium crucis* (circa 1420) also on the map in LA SALLE'S *La Salade*, written about 1440, printed in 1522 (Cf. the Facsimile-atlas, fig. 18 and p. 100).³ On the other hand, so far as I have been able to find out, Iceland is not marked on a single *portolano* of the 14th or 15th century. It is true that there are various islands marked to the north of Scotland on Dulcert's map of 1339, and on the Catalan Atlas of 1375, but none of them seems to be intended for Iceland. On Behaim's globe of 1492, however, a large island (ijsland) is inserted to the north-east of Scotland. It is adorned with a yellow standard bearing the three Danish leopards and surrounded by the following legends:

In der Insel ijsland fehet man den Stockfisch, den man in unser landt bringet.

In ijsland findet man schön weiss volk und sind christen; da selbst ist gewohnhit das man die hundert theuer verkauft u. ihre kinder geben sie hinweg den kaufleuten um gottswillen auf das die andern brod haben.

*Item in ijsland findt man menschen von 80 Jahren die nie kein brod gegessen; do wücht kein korn und an brodt statt ist man dörre fische.*⁴

While the map of Clavus and the maps of the Scandico-Byzantine type evidently drew their information from Northern sources, Behaim presents us with pre-Columbian notes on Iceland, communicated by sailors of south or middle Europe.

Iceland and Greenland further occur on Cantino's map of 1502 and on Ruysch's map of the world of 1508 (Facsimile-atlas, pl. XXXII); on the latter is added a small island between Iceland and Greenland with the following legend: *Insula hec in anno domini 1456 fuit totaliter combusta*. This island, destroyed according to the inscription, is placed exactly where one would expect to find the Hvitserk of the sagas, whence both Greenland and Iceland could be seen. During the 16th century Iceland was recognised on many of the *portolanos* that stretched far enough to the north, and was usually placed in about its right position in the Ocean. The outline of the island, on the contrary, was rendered in quite an arbitrary fashion. The same is also the case with Iceland on Olaus Magnus' *Carta Marina*; also with a special-map of Iceland (reproduced in our fig. 33), engraved on copper by FERANDO BERTELI, who evidently took Olaus Magnus as his pattern.

All the more astonishing is it to find in Mercator's atlas of 1595 a map of this island, remarkably good for the 16th century, and rich in details. It is reproduced here (fig. 37)

¹ In the Facsimile-atlas, p. 60, the long title of this work is given, with bibliographic details.

² Its publication was also attended with considerable expense. In a letter from Olaus' brother Johannes Magnus to Damianus a Goes, inserted in the latter's *Opuscula Lovanii* 1544, it is said that Olaus Magnus for printing his *Charta gothica* contracted a debt of 300 ducats. In another place Olaus states that the whole cost amounted to 440 ducats (KARL AHLENIUS *op. cit. infra*, p. 59).

³ If the original text corresponds with the text of the work printed in 1522, LA SALLE was the first person of the Middle or South of Europe to mention Iceland and Greenland "Il ya une yslle nommee yslant, ou sont les pays nommez Gronellont & unimarch, ou a grant quantite de ours, qui sont tous blancs" (folio XXXIX).

⁴ According to F. W. GHILLANY'S reproduction of the map of Behaim's globe in *Geschichte des Seefahrers Ritter Martin Behaim*, Nürnberg 1853.



38. Map of Europe in Mercator's Atlas, 1595. (Orig. size 0.47 X 0.382 m.)

on a somewhat diminished scale. It is said to be based on information given by the Icelandic bishop Gudbrand Thorlaksson.

The cartography of the British Isles developed quite independently of that of the other northern countries. They had already, except for the great projection from Scotland, received a fairly correct shape in Ptolemy. On the atopic maps of the world these countries occur as arbitrarily drawn islands on the north-west edge of the map. But even from the 13th century we have maps of England, founded on actual observations, inserted together with a map of the world in different codices of the works of MATTHAEUS PARISIENSIS, chronicler at St. Albans monastery, who died in 1259. Reproductions of these maps were given by RICHARD GOUGH: *British topography*, London 1780. They have recently been published again, together with an explanation of the legends, by KONRAD MILLER: *Die ältesten Weltkarten*, III, Stuttgart 1895. Miller considers Matthaëus as the first mediaeval geographer to leave us not only cosmographic drawings but real maps; for these maps are about 50 years older than the oldest known portolanos. As regards Matthaëus' map of the world, it manifests a total ignorance of the geography of north Europe, and the disproportionately great width given to the Italian peninsula suggests a southern model. The picture of the world is inferior to that of most mediaeval atopic maps. The map of England on the contrary is incomparably better, but, as shown by the reproduction on pl. XXXIII, cannot be placed on the same level as contemporaneous portolanos of the Mediterranean and Black Sea.

On the oldest portolano known, the Carte pisane, Ireland is not laid down, while England is of very incorrect shape, with only a few legends, often wrongly placed. Not long after, however, the portolan-type for the British Isles was developed, and was reproduced with but slight alteration on the portolanos by Vesconte, Dulcert, Soleri, Andrea Bianco, Freducci, Olives, Voltius and others, from the beginning of the 14th century to the end of the 16th. Maps of this type are without the great eastward projection from Scotland that occurs on Ptolemy's maps. In its stead Scotland ends on the north in a rather long and even stretch of coast, and is generally separated from England by a strait, formed through the map-draughtsman having connected the firths of Clyde and Forth by a narrow channel. This drawing, with the above mentioned strait omitted, served as the basis of the first printed *tabula moderna* of England in Ptolemy's Geography, Argentorati 1513 (Facsimile-atlas, fig. 6), and of almost all non-Ptolemaic maps of England during the following four decades.

Yet so soon as the beginning of the 15th century far better maps of England, Scotland, and Ireland than those just mentioned seem to have been available in the South. Two such maps (N. T. XXXIII) occur in the same Buondelmonte-codex as contains the remarkable map of Scandinavia here reproduced on pl. XXXII. They probably form copies of maps from the beginning of the 15th century, and for that time are fairly correct, although by no means comparable to the portolanorepresentation of the Mediterranean and Black Sea. It is remarkable that the shape given to the north part of England and Scotland in these maps recurs in the map of the world in SCHEDEL's *Liber cronicarum*, Nurembergae 1493 (Facsimile-atlas, fig. 5), and in the large map by OLAUS MAGNUS (*op. cit.* fig. 32).

The incunabula-period of the cartography of England and Ireland ends in the middle of the 16th century. There are

not extant, it is true, any maps of the British Isles drawn in England during this period, but the two following maps, engraved on copper in Italy, being founded on extensive observations in the country itself, mark the advent of the new era.

1) A map by SEBASTIANUS A REGIBUS CLODIENSIS engraved on copper: "Britanniae insulae quae nunc Angliae et Scotiae regna continet cum Hibernia adjacente nova descriptio, Romae Anglorum studio et diligentia MDLVIII" (0,541 X 0,398 m.). The map, however, was drawn earlier, for it corresponds with the map of Britain in the portolan-atlas of Battista Agnese of 1554. It is reproduced in my Facsimile-atlas, fig. 78.

2) A map engraved on copper by FERANDO BERTELI: "Britania Insula quae duo regna continet Angliam et Scotiam cum Hibernia adjacente, Venetiis MDLXII."

At the same time MERCATOR completed the copper engraving of "Angliae, Scotiae & Hiberniae nova descriptio" in eight folio-sheets (0,325 X 0,450 m.), one of the most perfect cartographical works of the middle of the 16th century. In this case, according to an inscription on the map, Mercator was only the engraver. The name of the map-draughtsman is not mentioned.¹ It was probably the learned English antiquary Humphrey Llwyd (Hunfredus Lhuyd Denbygiensis who died about 1570), who in *Catalogus auctorum* in the 1570 edition of ORTELIUS' *Theatrum orbis terrarum* is quoted as the author of an *Angliae Regni Tabula*.

Simultaneously with these maps of England, two charts of the south Baltic, engraved on copper, were published in Italy, viz.,

1) "Septemtrionalium regionum Suetiae, Gothiae, Norvegiae, Daniae et terrarum adjacentium recens exactaque descriptio," Tramezini formis, 1558. It is here reproduced on pl. XXXIV, from a copy which is incorporated with a collection of Italian maps belonging to the University-library at Rostock.

2) A beautiful chart of the south Baltic and the North Sea, "Venetiis anno MDLXII apud JOANNEM FRANCISCUM CAMOCIIUM." Reproduced in the Facsimile-atlas, fig. 25.

Both these maps evidently are only copies of a northern chart, which in turn seems to have been based on sailing-directions for skippers in the first half of the 16th century. This is proved by the fact, among others, that the drawing of the south Baltic and the North Sea on Mercator's large map of Europe of 1554, recently found again,² corresponds with the two Italian maps mentioned above, although a greater abundance of legends distinguishes Mercator's work. The actual originator of this new, relatively correct, map-type of south Scandinavia and the Baltic is not known. For I consider it little likely to have been, as ERSLEV supposes,³ the burgomaster of Crempe, Marcus Jordanus, who died in 1595 with a name in other respects famous in the geography of Denmark. He, who for a time had been teacher of mathematics at the University of Copenhagen, seems chiefly to have composed land-maps, and so far as can be seen from the biographical data adduced by Professor Erslev, hardly occupied himself with the production of sea-charts. In the later editions of ORTELIUS' *Catalogus auctorum* is mentioned a map of Denmark published by Jordanus, printed at Copenhagen in 1552, and a map of Schleswig-Holstein printed at Hamburg in 1559. The originals of these maps are lost; but the latter is reproduced in editions of ORTELIUS' *Theatrum* from 1579, the former in editions of the same work from 1595. The map of Denmark certainly is founded in part on the same sailing-directions as were the Italian copper-engravings.

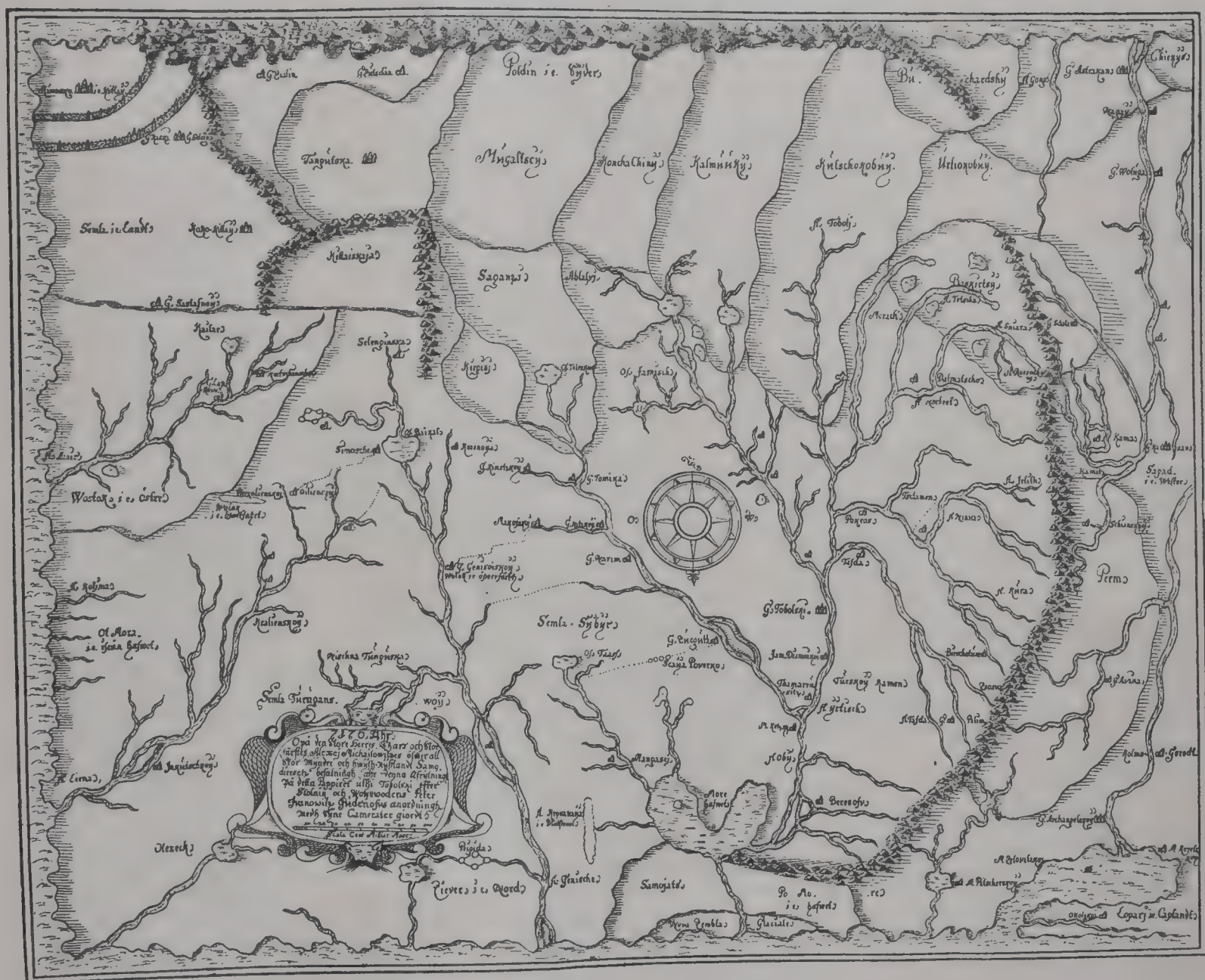
¹ Mercator's maps of Europe of 1554 and of England of 1559 were, as is well known, lost till they were found again quite recently by Dr. Alfons Heyer in the town-library of Breslau. They, as well as a copy of the map of the world (1569) by the great geographer found in the same library, have subsequently been reproduced in a model manner by phototype by the "Gesellschaft für Erdkunde zu Berlin" (*Drei Karten von Gerhard Mercator*, Berlin 1891). Through this masterly publication that celebrated society has rendered the historian of geography a service that cannot be estimated too highly.

² ERSLEV: *Jylland*, Kjøbenhavn 1886, p. 144. Cf. also G. BRUNN: *Cornelius Antoniades Kaart over Danmark og Zenikaartet af 1558* (*Geografisk Tidsskrift*, IX, Kjøbenhavn 1888, p. 146). Antoniades or Antonii seems to have been a Dutch artist and engraver, who among other things also engraved maps of the type here in question; but there is no reason to believe that he was their author.

With the above-mentioned maps of the British islands and the Scandinavian peninsula the incunabula-period of the charts of northern Europe may be considered closed, so far as the countries in the immediate neighbourhood of the pole and beyond the north coast of Scandinavia are left out of count. The former for the most part still constitute a *terra incognita*, in spite of the many expeditions fitted out for the exploration of the polar regions. Here, however, the cartographers of the 16th century, from Ruysch to Mercator, have placed a number of large islands, often furnished with fantastic legends. Such maps are those reproduced in the Facsimile-atlas, fig. 60, as well as on pl. XXXII and XLVIII. They are based on a work by NICOLAUS DE LINNA, *Inventio fortunata, qui liber incipit a gradu 54 usque ad polum*.

Mathematicum terras polo circumvicinas descripsisse & astro-labio dimensum esse in hanc sequentem formam fere, uti ex Iacobo collegimus. Euripos illos quatuor dicit tanto impetu ad interiorum voraginem rapi, ut naves semel ingressae, nullo vento retroagi possint, neque vero unquam tantum ibi ventum esse, ut molae frumentariae circumagendae sufficiat. Simillima his habet Giraldus Cambrensis in lib. de mirabilibus Hiberniae . . .”

Mercator's map was published in the first edition of the Atlas, dated 1595. That the map was completed at an earlier date is proved by its being quoted on p. 248 of HAK-LUYT: *The principal navigations*, edition 1589, with the addition that Jacobus Cnoyen [sic] got his story “ex rebus gestis Arthuri Britanni . . ., majorem autem partem & potiora



36. Map of north Asia by PETER GUDENOW, 1668. (Orig. size 0.38 x 0.305 m.)

This has been lost, but is quoted by Ruysch in a long inscription (“Legere est in libro de inventionem fortunati” etc.) on his map inserted in the Ptolemy-editions, Romae 1507 and 1508 (Facsimile-atlas pl. XXXII), as well as at a later date on the back of MERCATOR'S *Septentrionalium terrarum descriptio* (op. cit., fig. 60) in the following words: “Quod ad descriptionem (septentrionalium terrarum) attinet, eam nos accepimus partim ex Hugonis Willoughbei equitis, Richardi Chanceleri, Stephani Boroughij, Arturi Pet. & Caroli Iacmans, Iacobi Aldaij, Martini Frobischeri, Iohannis Davis & aliorum Anglorum navigatoris observationibus, partim ex itinerario Iacobi Cnoxen Buscoducensis, qui refert (quod tamen ab alio prius accepit) Minoritam quandam Anglum Oxoniensem

a sacerdote quodam apud Regem Norvegiae, An. dom. 1364.” He also states that the name of the Oxford mathematician was Nicholas de Linna, and that the journey was undertaken in 1360. Hakluyt further quotes (p. 249) an account of the journey of Nicholas de Linna by “the learned mathematician” John Dee (born 1527, died 1607). In addition to further details about the journey itself, he mentions that king Edward III (died 1377) granted the fishermen of Blacknie in Norfolk several privileges and freedom from ordinary service on account of their navigation to Iceland—a statement of no small importance for the history of navigation. The journeys of Giraldus Cambrensis, or Gerald Barry, who was born about 1146, and of Nicolaus de Linna evidently belong to

the romances of geographical literature. Their stories seem, however, to have been based on actual voyages in the open ocean, and therefore deserve a place in the history of navigation. Moreover they long exercised a great influence on the representation of the arctic countries. As regards the journey of the celebrated Oxford mathematician, it must further be remembered that the variation of the compass was not yet known in 1360, and therefore, if the account of his journey has any foundation at all, he ascribed to the true pole observations made in the neighbourhood of *the magnetic pole*. This is, at least in its present position, surrounded by large islands separated by narrow straits. Thus the distribution of land and sea here bears some resemblance to the polar maps of Ruysch and Mercator.

The polar circle was for the first time passed by sailors from the south in December of 1431. A Venetian nobleman, Pietro Querini, travelling from the Mediterranean to Flanders, when off England met with a severe storm, at the mercy of which the helpless vessel was finally driven to Lofoten, where Querini himself and part of the crew were rescued. An original account of this journey is still extant. It has often been published in print, the first time being in the second part of RAMUSIO's well-known work.

The north point of Scandinavia was circumnavigated so early as the 9th century by the Norwegian Othere (Ottar), who was the owner of a large estate in Halogaland on the north-west coast of Norway. Like many Scandinavians of that time, Othere had travelled far and wide, and on one of his wanderings came to the court of the Anglo-Saxon king Alfred, who died in 901. To him Othere, among other things, told of a journey which he had undertaken in order to find out how far the coast of Norway extended to the north, and whether there were people living beyond the wilds that lay close to Othere's home. Fortunately this knowledge-loving king inserted the story in a translation of *Historiarum adversus paganos libri VII* (or *De miseriis mundi*) written by PAULUS OROSIO at the beginning of the 5th century. Thus was preserved the memory of the voyage on which the north point of Scandinavia was discovered. The story of Othere also gives important information concerning the ethnographic conditions of the northernmost part of Europe during the close of the first millenium of our era. Subsequently the voyage from Norway round the North Cape was often repeated, sometimes on plundering forays, sometimes for peaceable trade with the Biarmians on the White Sea.¹ From the east the North Cape was doubled for the first time, so far as is known, in 1496, during a voyage undertaken at the command of the Tsar, by Gregory Istoma, from the White Sea to Denmark.² The name "North Cape", however, was first given to this point after Sir Hugh Willoughby in 1553 had made the earliest attempt to reach China by the north-east passage.³ It was this voyage that opened communication between England and Russia by way of the White Sea.

On the mapping of the North of Europe these voyages had little influence, a fact evidently dependent on the slight development of the art of map-drawing in Scandinavian countries as well as in England down to the middle of the 16th

century. The map of CLAUDIUS CLAVUS, for instance, affords no indication of a real knowledge of the northernmost part of Scandinavia, while these regions are quite as incorrectly represented on the Scandico-Byzantine maps. On ZIEGLER's map of 1532 the north point of the Scandinavian peninsula is placed, it is true, at a fairly correct latitude, while to the east of it are marked *Stappen* and *Wardhus castrum*; but here the land first curves northwards and then westwards to Greenland. The land is far better laid down on the large map by OLAUS MAGNUS; but not as regards the degrees of latitude, since the north point of Scandinavia according to the graduation on the left margin of the map is placed actually at the pole, and according to the graduation on the right margin, two and a half degrees on the other side of the pole. And yet Olaus Magnus had visited the north west coast of Norway himself; but he had evidently no idea of mathematical geography and to his patriotic-chauvinist eye everything in the North was swollen to gigantic dimensions. On GERHARD MERCATOR's large map of Europe of 1554 the White Sea and the Solowitski monastery are marked, but the map-draughtsman as yet knows nothing of the north-east voyages of the English begun in 1553, and but little of HERBERSTEIN's *Moscovia*, the first edition of which appeared in 1549. The account of these journeys and the information about North Russia given by Herberstein have, however, caused the introduction of various corrections to the map of Europe in the reproduction of his father's work given by RUMOLDUS MERCATOR in the first edition of *Atlas* (1595). Mercator's map is here reproduced in fig. 38.

On none of these maps is the name North Cape marked. We find it first, so far as I am aware, on pl. I of LUCAS WAGHENAER's *Spiegel der Zeevaart*, Leyden 1584. This name also occurs on the map of Europe in CORNELIUS DE JUDAEIS' *Speculum orbis terrae*, Antverpiae 1593.

A map of Russia as far as the White Sea, founded on actual though defective observations, was published by ANTHONIUS WIED. According to the long legend in the left-hand corner, this map was drawn in 1555. The original has, however, been lost, so that there is only extant a copy engraved on copper by Hogenberg in 1570. I give on pl. XXXV a reproduction of this rare copper-engraving from an original in my collection. It has previously been reproduced by Dr. H. Michow in *Die ältesten Karten von Russland*, Hamburg 1884.

Subsequently the European coast of the Arctic Ocean from the North Cape to Nova Zembla was completely mapped during the English and Dutch expeditions for the discovery of the north-east passage, from Sir Hugh Willoughby to Barents (1553—1596).⁴ A short account of the north-east voyages, with numerous references to the literature on this subject, is given in *The Voyage of the Vega* vol. I, chapters 1, 5 & 6.

The boundaries of Asia towards the north⁵ are not marked on Ptolemy's atlas. HERODOTUS (IV: 45) expressively admitted that so far as was known no one had sought whether the north and east parts of Europe were surrounded by water or not. STRABO (I: 1) on the contrary says that in all di-

¹ King Alfred's Anglo-Saxon translation of Orosius has been published by DAINES BARRINGTON, London 1773; JOSEPH BOSWORTH, London 1859, and HENRY SWEET, London 1883. A masterly translation into Swedish of the journey of Othere is given by GABRIEL PORTHAN in *Vitterh., Hist.-o. Antikvitetens-akad. handlingar*, VI, Stockholm 1800, p. 37. Cf. also *The Voyage of the Vega*, I, p. 44 and GUSTAV STORM: *Om opdagelsen af Nordkap og veien til det Hvide hav* (*Det norske geogr. selskabs aarbog*, Kristiania 1894).

² An account of the voyage of Istoma is inserted in SIGISMUND V. HERBERSTEIN's *Rerum Moscovitarum Commentarii*, Wien 1549, fol. XXVIII, in the second of the separately paged divisions of the work.

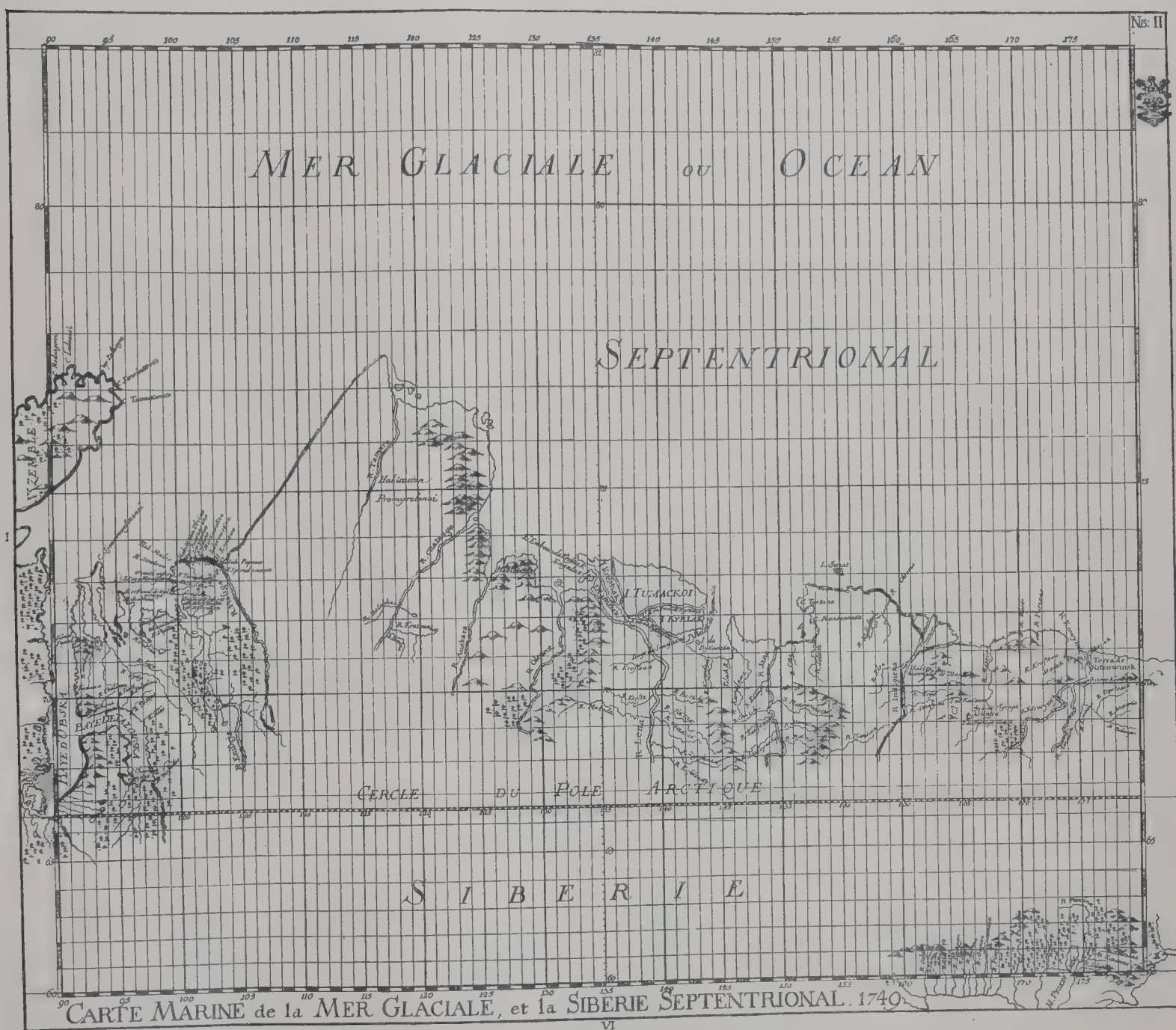
³ A collection of original documents and original accounts of the first north-east voyages of the English is inserted in RICHARD HAKLUYT: *The principal navigations etc.*, London 1589. Cf. also *The Voyage of the Vega*, I, pp. 55 *et seq.* In the latter work an authentic portrait of Sir Hugh Willoughby, the pioneer of England's world-commerce, is published for the first time. The name North Cape first occurs in Stephen Burrows' (Burroughs') account of his north-east voyage of 1556 in these words "At a North sunne the North cape (which I so named the first voyage) was thwart of us." (HAKLUYT, *op. cit.*, p. 313.)

⁴ In the library of Skokloster (though now deposited in the State Archives at Stockholm) there is a large manuscript map of the Kola peninsula with Scandinavia and Finland, prepared in 1601 at the request of King Christian IV of Denmark by SIMON VAN SALINGHEN.

⁵ An exhaustive account of the development of our knowledge of the north coast of Asia is given in *The Voyage of the Vega* (vol. II, chapter 13). When it was published the map by Gudenow, quoted below, was not yet known.

rections where men had penetrated to the utmost limits of the earth, they had met the ocean. The same is the opinion of PLINY, who further (VI: 17) speaks of two promontories projecting from Asia towards the north, Promontorium Scythicum and Tabin. Marco Polo gives some account of what is now called Siberia and of the voyage thither, but he nowhere definitely states the fact that Asia is bordered towards the north by the sea. On the maps of the world drawn during the Middle Ages it was in any case necessary to finish off Asia somehow towards the north and east. The Asiatic continent was therefore extended nearly to the edge of the wheel-map, only a narrow belt being left for the ocean, which was supposed to surround all three continents. Evidently there was

the creation of the world then in force, and corresponds to the time from September 1667 to August 1668 A. D. The map was sent to Moscow, but the Russian original has been lost. Fortunately, in the meantime a Swede, CLAS PRYTZ, who accompanied the embassy to the Russian Grand Duke in 1668, had procured two copies of this, the first map of north Asia and perhaps the first map drawn by Russians. Both these copies, which closely correspond, are preserved in Stockholm, the one in the State Archives the other in the Royal Library. They, together with a short account of the oldest cartography of north Asia, have been published by me in *Ymer* (VII, 1887, pp. 133 *et seq.*). One of them is here reproduced in fig. 39. There is a third copy (N. T.



40. Chart of the Arctic Ocean in *Nouvel atlas de marine* par ISAAC BROUCKNER, Berlin 1749. (Original size 0.515 x 0.448 m.)

no real knowledge of the Asiatic part of the Arctic Ocean. This was first acquired through the conquest of Siberia by the Russians. Here it should be noted that the Siberian Cossacks, whose hardiness, courage, and love of adventure may justly be compared to that of the Spanish conquistadors, often during their spreading towards the east, preferred the sea-route from river-mouth to river-mouth to the over-land route. By this means they early learnt to know a large part of the Arctic coast.

The first map, on which these observations were introduced, was made by PETER IVANOVITSCH GUDENOV "and his comrades", in 1717, at the command of the Tsar Alexej Michailovitch. The date refers to the Russian chronology after

A. E. N. II.

XXXVI) among the maps appended to an account of Russia by the Swede, Captain Eric Palmquist. This account was presented to King Charles XI in 1674, and is at present preserved in the State Archives at Stockholm.

Another far more complete atlas of Siberia, by SIN BOJARSKI SEMEN REMESOV, of Tobolsk, was finished in 1701 and is still extant. It consists of numerous large-scale maps, which were reproduced at the cost of Mr. Lichatshev by the Archaeographic Commission of St. Petersburg in 1882. The maps themselves are exceedingly rich in geographic and ethnographic details, although of very elementary technique. Map No. 25 is an ethnographic map of the tribes then living in Siberia.

No. 23 forms a general synoptic map, much like Gudenov's, but with numerous important additions. One of the New Siberian Islands, for instance, is marked off the mouth of the Lena. A little further east projects a long point on which is written *Okomvassbaere Caep*. This inscription, probably added by one of the Dutch counsellors of Peter the Great, after the arrival of the map at Moscow, shows that the voyage of Deschnev from the river Lena to Kamtschatka was not then known at Moscow. Perhaps from these studies of the map, to which the added Dutch inscriptions bear witness, we may conclude that the Tsar Peter also dreamt of a north-east passage to China. It is plain that he was the right man to understand its value. This important map is reproduced on a somewhat diminished scale on pl. XXXVII.

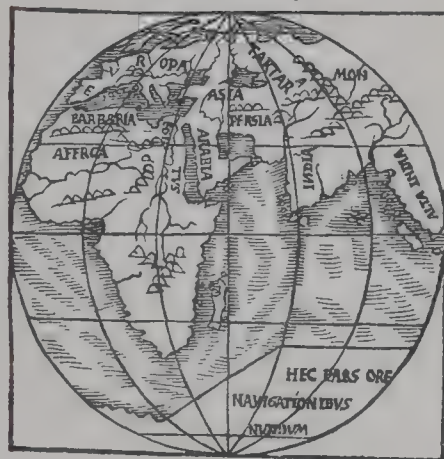
To the incunabula-period of cartography must also, as regards the drawing of the north coast of Siberia, be reckoned all the maps of the 17th century that include this coast line; and among them NICOLAE WITSEN's large map of Siberia, a copy of which is preserved in the library of Upsala. Here also belongs the map by the Swede, Captain STRAHLENBERG, reproduced on pl. XXXVIII, composed during

The north coast of Asia was really mapped first during the *Great Northern Expedition*, from 1734 to 1742, by BERING and his officers, Malygin, Ovzyn, Minin, Prontschischev, Cheljuskin, Laptev and others. Little reliance, however, was placed on their cartographical work by the leading men of St. Petersburg, till they were confirmed in the main through voyages along the north coast of Siberia by Hedenström (from 1809 to 1811), Ferdinand von Wrangel and Anjou (1823) and others, as well as through the circumnavigation of Asia during the Vega Expedition from 1878 to 1880.

No official and complete atlas, faithfully rendering the observations of the Northern Expedition, was published during the 18th century. But several manuscript maps of different coast-lines visited by the expedition seem to have spread gradually to western Europe, probably through the diplomatists, on account of the importance attached to a communication by the north-east route between Europe and China. Thus the map of Bering's first voyage was presented to the king of Poland shortly after the navigator's return to St. Petersburg in March 1730. The king communicated it to Father DU HALDE, who used it for his great work *Description . . . de la Chine*,

DE ORBIS

SITV AC DESCRIPTIONE. AD REuerendiss. D. archiepiscopum Panormitanum, Francisci, Monachi ordinis Frasciscani, epistola sancta qua luculenta. In qua Ptolemei, caterorumq; superioru geographorum hallucinatio refellitur, aliq; preterea de recens inuentis terris, mari, insulis. De ditio: ne Papae Ioannis. De situ Paradisi, & dimensione miliarium ad proportionem graduum caeli, praclara & memoratu digna recensentur.



CVM PRIVILEGIO INVICTISSIMI Romanorum imperatoris Caroli quinti, ad quinquenniū ne quis uel typis excudat, uel excudendos curet hos codices geographicos, una cū globis, sub multa amittendorum exemplariū, aliq; poena Principis seueritate inferenda.

A 2

41. Title-page and first page of *De orbis situ . . . epistola* etc. by FRANCISCUS MONACHUS, circa 1527. (Original size.)

his stay in Siberia from 1709 to 1721 as a prisoner after the defeat at Poltava. This map was printed for the first time at Stockholm in 1730.¹ It is a valuable original work, in which a man with a knowledge of topographical drawing has added his own experience to all the most important facts about the geography of the country known in the Siberia of his day. It was through Strahlenberg's map that the voyages of the Cossacks from the Lena to Kamtschatka were first recorded in geographical literature; and better than many an exhaustive monograph on the state of the ice off the north coast of Siberia, is Strahlenberg's legend: "Hic Rutheni ab initio per moles glaciales, quae flante Borea ad littora flanteque Austro versus mare iterum pulsantur magnoque labore et vitae discrimine transvecti sunt ad regionem Kamtschatkam."

la Haye 1736. Thence the map was copied by d'ANVILLE for his *Nouvel atlas de la Chine*, 1737. Of Bering's original map there are three copies in Swedish libraries (*Ymer*, IV, 1884, p. 93). In my own library is a manuscript map of Bering's last journey, by Lieutenant Sven Waxell, with German legends. How the cartographic labours of the Northern Expedition were finally regarded at St. Petersburg, is seen by the map (reproduced in fig. 42) executed by the Imperial Academy of St. Petersburg in 1758, and inserted in G. P. MULLER's *Voyages et découvertes, faites par les Russes*, Amsterdam 1766. Space does not here permit an account of other maps of the region in question published at St. Petersburg.

An earlier map of the north coast of Asia based on the works of the Great Northern Expedition is here reproduced in

¹ According to the genealogies of the Swedish nobility preserved in the House of the Nobles at Stockholm, the first copy of this map was completed before Strahlenberg's return from his captivity in 1721. It was sent to a merchant at Moscow, but when he died shortly afterwards, the map happened to be shown to the Tsar Peter, who did not return it. Strahlenberg, however, who was still in possession of his original sketch, spared neither pains nor expense, during the last three years of his captivity, in travelling far into the country in order to observe everything of note with his own eyes, and to set it down geometrically for a new map. After his return home he saw to the engraving of this map and published it in *Das nord- und ostliche Theil von Europa und Asia*, Stockholm 1730 (English edition, London 1738). Strahlenberg also determined astronomically some topographical positions in Siberia, the first observations of this kind in north Asia.



42. Official map of the Arctic Ocean, 1758. After G. P. Muller. (Original size 0.632 X 0.45 m.)

fig. 40. The original is to be found in *Nouvel atlas de marine par ISAAC BROUCKNER*, Berlin 1749 (the title engraved on pl. III). This atlas contains several remarkable maps, which, so far as I know, were the first maps printed on Mercator's projection in Germany.

Columbus died in the conviction that the countries discovered by him formed parts of Asia; and the first maps of the New World were drawn in accordance with this conception. But so early as 1512 Stobnicza of Cracow published a map in which America was drawn as a continent surrounded by water and separated from Asia by an immense ocean, in which the large island Zipangu was placed.

As regards the shape of the continent geographers were thus divided into two schools. The one made North America form the east coast of Asia, or at least join on to Asia by a more or less broad isthmus; the other drew the New World as a separate continental island in the ocean. A few (*e. g.* Bernardus Sylvanus 1511, Hakluyt 1587 and 1599, Ramusio, vol. III, suppl. 1606) left the question unanswered, representing the northern part of the Pacific Ocean, where the connection between Asia and America was supposed to take place, as an unknown region. All the continents form one large mainland intersected by deep bays on maps by Ruysch (1508), Franciscus Monachus (circa 1527; the first map of the world to be divided into two circular hemispheres),¹ Orontius Finaeus (1531—1566), Vopel (1543), in the editions of Ptolemy by Gastaldi and Ruscelli from 1548—1574, Girava (1566), and Myritius (1590). The New World on the contrary is drawn as an independent continent separated from the Old World on maps by Stobnicza (1512), Eschler's and Übelin's Ptolemy (1513), Boulenger (1514), Schöner (1515), Gregorius Reisch (1515), Apianus (1520), Bordone (1528), Grynaeus (1532), Honter (1546; the New World here forms two large islands, of which the southern is called *America*, the northern *Parias*), Mercator, Münster, Battista Agnese, Quad, Ortelius and others.²

On most of these maps the gulf or sound separating America from Asia has received an arbitrary shape completely differing from reality. An exception to this rule is formed by a map in Lafreri's atlas, which is reproduced in the Facsimile-atlas, fig. 81. In the upper left-hand corner of the sheet the following inscription is to be read: "Il Disegno del discoperto della nova Franza, il quale s'è havuto ultimamente dalla novissima navigatione de' Franzesi in quel luogo: Nel quale si vedono tutti l'Isole, Porti, Capi et luogi fra terra che in quella sono. Venetiis aeneis formis Bolognini Zalterij. Anno MDLXVI." The inscription indicates that the map was based on French information. Possibly it had for its author the same Nicolas de Nicolay who published the above-mentioned chart engraved at Venice in 1560 (p. 72 & Pl. XXVII). The map is remarkable for the correct disposition of the north-west coast of the New World with California and of the strait between Asia and America; and it is not a far-fetched supposition that the drawing of the map was based on an otherwise unknown coasting-voyage along the north-west of America, probably by Spaniards. The north-east part of the new continent is probably, as the title seems

to indicate, drawn after French information. Since 1504, seamen from Biscay, Brittany, and Normandy have practised fishing at Newfoundland, and so early as 1506 a Frenchman, Jean Denis of Honfleur, is said to have mapped the present Gulf of St. Lawrence. In 1523 the country round this gulf was taken possession of by the French; between 1523 and 1525 Verazani's voyages of discovery from Dieppe took place; between 1534 and 1536 Jacques Cartier, and between 1541 and 1549 François de la Roque, seigneur de Roberval, both under royal patronage, tried to colonize the new country (CHARLEVOIX: *Histoire de la Nouvelle France*, I, pp. 3 et seq., Paris 1744). Thus, when the map here in question was engraved, Frenchmen had had no little connection with the north part of the American continent, and new enterprises in the same direction were, so to speak, the order of the day in French ports. It was probably this that led to the compilation of the map of "Nova Franzia" in Venice from all the material accessible in that city, also of Nicolaus de Nicolay's chart of the Atlantic Ocean, here reproduced on pl. XXVII.

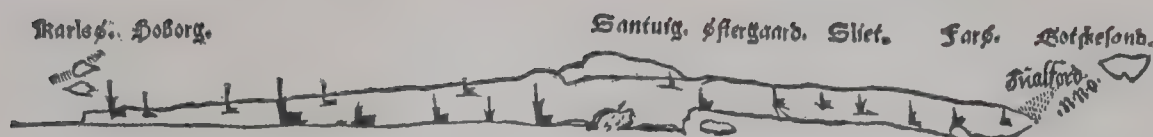
However this may have been, there is no doubt as to the success of the map-draughtsman, who, more than 200 years before Cook sailed through Bering's Strait, laid it down with relative accuracy. In 1648 the Cossack Deschnev also passed the north-east point of Asia on his remarkable voyage of discovery from the Kolyma to the mouth of the Olutorsk, and a note on Strahlenberg's map shows that other Russian fishermen even crossed the Strait and visited the part of America situated opposite the north-east part of Asia.

On Zalterius' map of North America, Bering's Strait is denoted by the name *Streto de Anian*. This name plays a great part in the literature of imaginary geographical discoveries rising out of a memorandum of the Spanish navigator and adventurer Maldonado (died 1625) to the Spanish government about the discovery of the Strait of Anian, "made by me, Captain Lorenzo Ferrer Maldonado, in the year 1588." The account, which has been translated and published in Italian and French by CARLO AMORETTI, and in English by JOHN BARROW, is a pure fiction, which, however, attracted a great deal of attention in its time, since it was thought to be a proof of the possibility of the north-west passage. A special expedition even was sent from Spain in order to confirm the concocted statements. It may therefore be of interest to point out that *Maldonado's map of the Anian Strait forms a copy, drawn on a larger scale and in altered style, of the map of the strait on Zalterius' map of 1566.*

The way in which the north coast of America was drawn during the 16th century is shown by numerous maps of the world of that period, reproduced in my Facsimile-atlas. All these drawings are purely imaginary pictures, the shape of which was greatly influenced by the conviction of a north-westerly connection between the Atlantic and the Great Ocean. True mapping of the northern border of the New World was first accomplished during the expeditions fitted out to discover the N. W. passage from Frobisher, Davis, Hudson, Baffin and others down to Parry, Franklin, McClure, and McClintock. An account of the charts made on these expeditions, and on the Arctic expeditions to Smith Sound, the north and north-east coasts of Greenland, Spitzbergen, and Franz Josef Land would, however, carry me too far beyond the plan of the present work.

¹ *De orbis situ etc.* (see fig. 41). Ends: *Excudebat Martinus Caesar, expensis honesti viri Rolandi Bollaert, commorantis Antverpiae iuxta portam Camere, sub intersignio maioris falconis albi.* HARRISSE gives 1524 as the year of printing of this small but remarkable work. This, however, is probably incorrect; for my copy was bound with a work by SCHÖNER evidently contemporary and similar in topographical respects: *Typus globi astriferi*, printed by the same topographer *impensis honesti viri Rolandi Bollaert An. M. D. XXVII.*

² All these maps are reproduced in the Facsimile-atlas, except the maps of the world by Franciscus Monachus and Battista Agnese, which are here rendered in fig. 41 and plate XXIV.



43. Outline of Gotland from LAUR. BENEDICT'S Sökarte, Kjöbenhavn 1568. (Original size.)

XI.

Sailing-directions for the Northern Seas

by

E. W. Dahlgren.

While the ancient and mediaeval directions for sailing in the Mediterranean chiefly refer to coasting from port to port, the oldest Northern writings of this kind are directions for voyages straight across the ocean from Norway to Iceland and Greenland.

Such instructions are to be found in Olaf Tryggvason's Saga, written about 1200 A. D. by the monk Gunnlaug Leifsson. The same instructions are repeated, with more or less expansion, partly in the Landnamabok, the oldest extant edition of which was written about 1250, and in Hauksbok (Hauk died in 1334), partly in the well-known description of Greenland that goes by the name of Ivar Bardsson's (1341).² In the 112th chapter of the Icelandic translation of Olaf Tryggvason's Saga, made about 1300 A. D. (the Latin original is lost) this direction runs as follows:

"So say knowing men, that from Stadt in Norway it is seven days' and nights' sail to Horn on Iceland's east coast, but from Snaefellsnes, whence the way to Greenland is shortest, it is four days and nights' sail over sea to the west. It is said also that when one fares from Bergen to Hvarf in Greenland one should sail twelve miles south of Iceland. From Reykjanes in south Iceland it is five days' and nights' sea to Jolduhlaup in Ireland towards the south, but from Langanes in north Iceland it is four days and nights' sail towards the north to Svalbard in Hafsbotn."

The scantiness of these directions has in olden times as well as in later years given rise to different interpretations, especially with reference to the situation of the ancient Eystríbygd in Greenland; and unfortunately they throw no light on the nautical knowledge of the ancient travellers to and from Iceland and Greenland or on their way of navigating the ocean without compass or chart. Nevertheless, they are of prime importance as including *the oldest course-directions for sailing across the Atlantic*.

As coasting-directions might also be reckoned the lists of fjords preserved to us from Greenland as well as from Iceland.³ The original of the Greenland list of fjords has been lost, so that its age cannot be determined with certainty;

the Iceland list, however, of which several copies exist, is considered to date from about 1300 A. D. That the latter list of fjords was intended as a guide for sailors, is confirmed by the fact that the first "sea-book" printed in the North, which, closely following a Dutch original, gives directions for sailing to Iceland, inserts in connection therewith a list of the fjords.⁴

The next northern work of the kind in question dates from a time when Scandinavian sailors did not venture out on the open ocean so often as they had done, but began to confine their voyages to coasting in the home seas. This work occurs in a MS. belonging to the Royal Library at Stockholm, and on account of its chief contents is called "Kong Valdemars jordebog" (The Danish Domesday Book).⁵ It dates from the latter half of the 13th century. On sheets 127 and 128 of this MS. there is a sailing-direction which has, it is true, previously been published in print, but which, on account of the unsatisfactory way in which this was done,⁶ and because of its remarkable contents, may be again reproduced here. It runs as follows:

De ripa in flandriam ad cinkfal uelificari potest ij diebus et ij noctibus. De cinkfal ad prol in angliam ij diebus et i nocte. Illud est ultimum capud anglie uersus austrum et est processus illuc de ripa angulosus inter austrum et occidentem. De prol in britanniam i die ad sanctum mathiam. Inde ad far iuxta sanctum iacobum iij diebus et iij noctibus. Inde ad leskebone ij diebus et ij noctibus et totus est iste processus angularis inter austrum et occidentem.

De lekebone ad naruese iij diebus et iij noctibus angulariter inter orientem et austrum. De Naruese ad arragun iij diebus et iij noctibus. angulariter inter aquilonem et orientem. Inde ad barzalim i die. similiter inter aquilonem et orientem. De barzalim ad marsili i die et i nocte. fere uersus orientem. declinando tamen parum ad plagam australem. De marsili ad mezin in sicilia iij diebus et iij noctibus angulariter inter orientem et austrum. De mezin ad accaron xiiij diebus et totidem noctibus. inter orientem et austrum magis appropinquando ad orientem.

De utlengi usque calmarne x ukæio. Deinde usque skægge nes ii ukæ. Hinc usque waldö iiii et si placet ire per latus terre potest ire de waldö usque runö. queque distat a waldö ad i ukæio. Inde usque kline-skær. uel diuræholtsnub i. Inde usque geishammer i. Inde usque rox-hammer i. Inde usque æfra i. Inde usque winö i.

² *Grönlands historiske Mindesmaerker*, III, pp. 209—215, 250, 886; *Samlede Skrifter af PEDER CLAUSSEN FRIIS*, edited by G. STORM, Christiania 1881, pp. 206, 437, 467.

³ *Grönl. hist. Mindesm.*, III, p. 227; KÄLUND: *Bidrag til en hist. topogr. Beskrivelse af Island*, II, Kjöbenhavn 1879—82, pp. 359 *et seq.*

⁴ *Sökartel offuer Öster- og Vester Söen*, Kjöbenhavn, Laur. Benedicht, 1568, sheet 12 recto. The course to Iceland is hidden under the title *De Mase*, for it starts from the mouth of the Maas: the list of fjords follows it under the heading: *Dette er Fiorderne* (These are the fjords).

⁵ For this, see JOHANNES STEENSTRUP: *Studier over Kong Valdemars Jordebog*, Kjöbenhavn 1873—74. The sailing-direction is there briefly mentioned on page 294.

⁶ Printed in *Sagan om Ingvar Widtfarne och hans son Sven*, published by NILS REINHOLD BROCMAN, Stockholm 1762, p. 281; J. LANGEBEK: *Scriptores rerum Danicarum medii ævi*, Vol. V, Hauniae 1783, pp. 622—3.

sailors of that time hugged the coast, how they sought narrow passages within the rocks and did not avoid long divagations if only they might escape the dangers of the open sea.

It is strange that no contemporary sailing-direction for any other part of the coasts of Scandinavia has been preserved to us; neither has the work here in question, so far as is known, been made use of for any of the "sea-books" spoken of below. Perhaps this is because its practical gain was small, since the dangerous and confusing passages indicated in "Kong Valdemar's jordebog" could only be threaded by sea-farers under the guidance of pilots.

The above-mentioned sailing-directions of Northern origin were but isolated developments, or at all events did not contribute to the general history of navigation. The case was different with the directions for voyages along the west and north-west coasts of Europe; for these, under the names of "sea-books", "sea-charts" or "reading-maps", can be traced back to the 14th century, and certainly are of still older origin. Having been extended over wider and wider areas in the course of centuries, they were inserted in an improved state as the text in the oldest collections of printed charts, the connexion of which with modern charts is obvious.

The first to be published of the works in question,¹ is to be found in two different editions in a codex mentioned on page 74 as belonging to the Commercial Library in Hamburg, and published under the title: *Das Seebuch von KARL KOPPMANN; Mit einer nautischen Einleitung von ARTHUR BREUSING; Mit Glossar von CHRISTOPH WALTHER*, Bremen 1876. The MSS., which dates from the end of the 15th century, are Low German, but the language, according to a statement by the editor, shows traces of Flemish influence. We evidently have here a collection of sailing-directions from various places and various times, the oldest parts of which seem to have been composed at Bruges about a century before the present MS. was written down.

The coasts along which the sea-book is meant to guide the navigator are: the south coast of Spain from Cartagena through the Straits of Gibraltar to Cadiz, then the west coast of the Iberian peninsula, the Spanish and French coasts of the Bay of Biscay, the south coasts of Ireland and England, and the opposite French coast of the Channel; further the coasts of Flanders, of the Netherlands and Friesland to Heligoland. Finally the sea-book supplies directions for sailing through the Skager Rack, Kattegat, the Great Belt, the Sound, and the South Baltic, to Visby, Riga, and Reval. A last chapter, found only in one of the MSS., describes the east coast of England from Flamborough Head southwards.

Koppmann has drawn attention to the fact that the coast-descriptions of the Sea-book generally begin with the most distant point, and continue towards Flanders so as to finish by the Inlet of Zwin (outside Bruges) now silted up, or the English Isle of Thanet immediately opposite; the chapters that form an exception to this order are explained as later additions. This arrangement, of which no explanation is given, seems opposed to the natural order if the sea-book originated in Bruges. It is, however, found that the order used, with still fewer exceptions,² puts the starting point nearest the Mediterranean so as to proceed towards the north and north east, and this points to a far earlier origin, viz., the navigators of south Europe. If this be so, the sea-book in its

original form was a supplement to the portolanos of the Mediterranean, intended for navigation beyond Gibraltar.

At all events there is no doubt that the part of the sea-book dealing with the coasts of Scandinavia and the Baltic (chapter XII) is one of the latest additions. The instructions for the voyage to these regions takes the Isle of Walcheren as its starting-point. From there the direction is indicated to Lindesnaes and Skudesnaes in Norway as well as to Skagen (the Skaw), whence the course is made either through the Great Belt or through the Sound to Bornholm. Here the course divides, one route going to Revelkol on the Pomeranian coast, following it to Rixhöft, and ending partly by the mouth of the Vistula (Danzig) and partly by that of the Düna (Riga); the other turning north east to Gotland, where it again divides; one of these routes goes round Hoburg to Windau, Domesnaes, and Riga, while the other passes Gottska Sandön, Dagerort, Simpenaes, Odensholm, and Nargö and ends at Reval. Here it should be noted that both these latter routes touch at Visby, although that city was considerably out of the way for those going to Riga from Bornholm. This fact indicates that the directions of the sea-book for the Baltic voyages date from a time when Visby had not yet suffered any essential encroachment upon her position as intermediary for the commerce between western and eastern Europe. Though we



44. Map of north-west Europe. From the title-page of LAUR. BENEDICT'S *Sökarte*, 1568. (Original size.)

cannot refer the course-directions of the sea-book back as far as the time of the real greatness of Visby, i. e. the 12th century,³ being forbidden by the mention of Reval, which was founded in the beginning of the following century, yet we may take it for granted that these directions indicate those commercial routes across the South Baltic that were most followed up to the beginning of the 14th century.

Similar sea-books were without doubt commonly circulated among the navigators of western Europe during the Middle Ages. They were probably a regular manufacture, in the same way as the portolan-maps. On account of new observations special parts were revised and enlarged, and the later supplements were added uncritically by ignorant copyists between the older chapters of the sea-book. This is the reason why even the oldest editions of the work in question show a great confusion, not only in their geographical details, but also as regards the arrangement of the various nautical subdivisions. By these I mean the relations of the tides, the prevailing currents, the harbours and roads with instructions how to put into them, and as to the depth and the condition of the sea-bottom at the anchorages, and finally the courses,

¹ It is probable that when attention shall have been more directed to this hitherto overlooked literature, many and possibly older manuscript sea-books or reading-maps will be brought to light.

² Chapters VIII, XI, and part of XIII.

³ Cf. G. LINDSTRÖM: *Anteckningar om Gotlands medeltid*, I, Stockholm 1892, p. 107.

with a statement of the bearings and the distance between the more remarkable places on the coast—all which it obviously was the intention of the original author to describe different chapters for each stretch of coast dealt with.

This arrangement, which is perfectly clear in most of the parts of the sea-book, can also be traced in the only English sailing-direction of the Middle Ages that has hitherto been reproduced. This work is published under the title: *Sailing-directions for the circumnavigation of England, and for a voyage to the Straits of Gibraltar (from a 15th century MS.)*. Edited, with an account of the MS., by JAMES GAIRDNER, and a glossary by E. DELMAR MORGAN, London, Hakluyt Soc., 1889. The title chosen by the editors is misleading in so far as it is no continuous circumnavigation of the English coasts for which instructions are given. Instead, the work, after the pattern of the sea-book, contains descriptions of separate stretches of coast, beginning with Berwick-on-Tweed; thence it proceeds southwards and westwards to the Land's End, whence it passes to the French side of the Channel and, under the heading *In spayne and brelayne this is the cours and the tide*, describes the coast from St. Malo in Brittany to the Straits of Gibraltar (*the straitis of Marrok*). Then, under the heading *A neue cours and tide betwene Englonde and Irlonde*, there follow directions for sailing in the Irish Sea and round Ireland, a chapter that has no analogue in the Low German sea-book. Finally, part of the coasts previously described are treated of again from another point of view, which is indicated by the heading: *Here be the groundis of Inglonde brelayne and Cille* (the Scilly Islands).

Though the different nautical subjects are not so distinctly separated in the English sailing-directions as in the corresponding parts of the Low German sea-book, and though the descriptions do not actually coincide, yet it is quite evident that there is a close connection between the two works. It is even probable that they form different revisions of the same original; this is shown not only by the circumstance that the English description of the Irish Sea is shown to be a later addition by the words "A new course", but also by the almost literal correspondence that exists in some few instances. Since these coincidences chiefly occur in the parts that refer to the west coasts of France, it is probable that the common model for both the English and the Flemish Low German works was a French "Routier".¹

It is not known when the "sea-book" of Western Europe was first multiplied by the printing-press. The oldest known examples of printing of works of this nature are the following:

Dit is die Kaerte van dye Snyder zee tot dat Ranserdyep toe, ende tot dat Maersdiep toe, Om met schepen wt of in te zeylen van Amstelredam te zee waert. Ghedruckt Int Jaer. 1540.

Dit is die Caerte van der zee: om Oost ende West te zeylen, ende is van die beste Pyloots, ende wt die alder beste Caerten ghecorrigeert, diemen weet te vinden, ende elcke cust op tsijn gheset... Ghedruckt int Jaer. 1541.

¹ I have not had access to any "Routier" either in print or MS. As what is probably the oldest French work of the kind in question, BRUNET (*Manuel du libraire*, T. 4: 1428) quotes the following title from the beginning of the 16th century: *Le Routier de la mer iusques au fleuve de jourdain, nouvellement imprime a Rouen* (29 sheets in 8vo, without date of printing). In the British Museum is a work with the title: *The Rutter of the see... with the lawes of the yle Auleron and the iudgements of the see, with a Rutter of the North added to the same*. According to DELMAR MORGAN (op. cit. p. 24) the earlier part of this work was translated from a French Routier (anglice "Rutter"), while the latter forms a reproduction, made in 1541, of part of the above-mentioned "Sailing-Directions".

² According to P. A. TIELE (*Nederl. Bibliogr. van Land- en Volkenkunde*, p. 266) there is in the Royal Library at Brussels a "Caerte van der Zee", printed about 1520-1530 in Amsterdam by JAN ZEVEERSSOON CRUEPEL VAN DER SCHELLING. Since this book has not been accessible to me, it is impossible to state here what is its relation to the above-quoted editions.

³ As an example of the construction of the sea-marks of that time, may be quoted the information of the reading-map that there is a beacon with a barrel on a round rock outside the latter harbour, and on the starboard side of the entrance there is a hand showing that there is a rock under water at a depth of 5 yards.

Of neither of these works is more than a single copy known; both belong to the University Library in Amsterdam, and were published in photographic facsimile by the principal librarian, Dr. H. C. ROGGE, in 1885. That it is not their first editions that are here represented,² is shown by the fact that in the first quoted, which is a direction for sailing out of and in to Amsterdam, it is announced that "annually in the spring there are to be published works on the entrances, in what condition they then are." But in the latter work, which is a "sea-book" of wider content, the publisher, JAN JACOBSZON of Amsterdam, warns skippers, masters, and sailors from buying other "maps" than those that were supplied with his name and mark, for he had his work corrected once a year "wt die beste Caerten ende kenders van die zee."

A comparison of the Dutch "reading-map", printed in 1541, with the manuscript Low-German "sea-book", shows a marked correspondence. The chief differences are these: the geographical order is not the same, since the printed "map" begins at Bovbjerg on the west coast of Jutland, while the starting point of the "sea-book" is Cadiz (Calis-mains) in Spain; in the former the different nautical elements were more blended, or rather confounded; the reading map in its essential parts was enlarged and revised; and descriptions of quite new stretches of coast were added to it. A detailed account of the contents of the "reading-map" would take us too far, we will therefore only give a review of the parts that concern the Scandinavian North and the Baltic.

First we find a completely new chapter, which is altogether missing in the "sea-book", and which has for heading: "Hier beghint hoe men in Noorweghen seylen sal." This chapter consists of two sections, partly coincident. The one begins with Lindesnaes (de Noese), and further describes how to put into Stjærnsund (Scheeresont) outside Mandal, Hesnaes (Hessenessen) near Grimstad, Maerdö near Arendal, and the port of Lyngöer (Longe) between that place and Öster Risör.³ Here the "reading-map" makes a long jump to Kalfsund outside Hisingen and describes how to put in there past Winga and Tistlarne. The second part of the chapter goes back to Fleckerö outside Christiansand, and describes more fully, though partly with a repetition of what has been said before, the south coast of Norway all the way to Ferder (Verdero) and Söstrene (die Susters) as well as "Soenwater" (Christiania Fjord), "Graswijk" (Graesvig) and "Schipphil" (Skiebergskilen), all situated within these rocky islands. Then the north part of Bohuslän is passed over, and the description continues with Marstrand, Pater Noster, Winga, Kongsbacka, Malösund, and Nidingen. Then there follows, without connection with the foregoing, a number of courses from the Kattegat, and mixed with these, directions for the navigation along the coast of Halland, from Kullen (Col) and Halland's Väderö (Swederoer) in the south, back to Malösund and the good harbour "Munstersont" (Malö hamn) situated within it towards the north. First after this there follows, under the heading *Vanden Swine oostwaert*, a portion corresponding to Chapter XII of the "sea-book", dealing with the voyage from Walcheren to the Baltic; but this description too is interrupted by statements about the banks in the North Sea and about the course-lines there as well as in the Kattegat,

and so on, inserted in a disconnected and confused fashion. Add to this that the "reading-map" ends with a course through the Great Belt, beginning at Lübeck, and it will appear that the Northern part of this work, not counting smaller additions, consists of at least five independent accounts, and that the attempts made to work these together did anything but contribute to the clearness and order of the whole.

If, finally, we look at the part of the "reading-map" of special interest to Swedes, namely that dealing with the Baltic, we find as a rule that the courses of the "sea-book" are there retained. The route along the south coast of the Baltic is, however, extended from Domesnaes to Pernau; while of the route from Bornholm by Visby to Riga, there only remain the courses from Bornholm to Hoburg and thence to Windau. The "reading-map" thus points to the altered conditions that came in with the decline of Visby during the later Middle Ages; that simultaneously Baltic navigation made a considerable advance, is shown by the indication of a new course, direct from Bornholm to Riga;

they afford no assistance in the determination of date. Comparison with later works of the same kind, however, leads us to suppose that the supplements to the sailing-directions of the "sea-book" occurring in the "reading-map" were added during the 15th century.

Among the editions and revisions of the West-European "reading-map" published, doubtless in great numbers, during the 16th century, the following are known to me:

1566. *Dit is die Caerte vander See om oost ende west te seylen . . . Verbetert, ende vermeerderd, met veel schoone Figuren daer by gemaect. Ende oock salmen hier in vinden, wat een Man van noode is, omme Stuermanschap te leeren.* Anno 1566. [At the end:] Geprint Tantwerpen . . . by mi Jan Roelants . . . MCCCCCLXVI. [Copy in the Great Royal Library in Copenhagen.]¹

1568. *Søkartet offuer Öster- og Vester Söen; vdi huilcken mand finder paa det allerflittigste aff de beste Piloter*



Dit is gheconterfept op die rugge bonige hoek op die west zijde van die Langefont/ende op sommighe andere plaetsen / soo nae int plat te maechen als men mach / ende op sommighe plaetsen is die diepte by cijffer gheset/want in die Wijck van die Langefont is ouer al Anc. Die Wijck her gront op die diepte daer dat cijffer wt wijft. Die lange Sont leyt van die wt Clippen by oosten Jofferlandt noorden of daer omtrent/ een groot half mijl op die Pool hochede 58. graet 56. min. Die Langefont leyt van Schager Af 19. mijlen/49. minuten/Continchau n/w/Langefont van Dornues 20. mijlen.

A Dat is Jofferlandt.	E Conincshau	H Dat leeghe landt van die Rys.
B Die Clippen daer by oosten.	F Die oude Langefont.	I Die wt Clippen van die Laerwijck ligghen van der achter een Singel.
C Die hauen van Abbeuoozt.	G Die hauen van die Ryslig.	
D Die Baerts.		

die Langefont s/o/bant west epnt. Want Jofferlant n/o/ten o/2. mijl of 2. Dit zijn 1 waer der a/ende dit zijn . . . blinde Clippen.

45. Chart of part of the south coast of Norway. From ADR. GERRITZSOON's Zeevaert, 1588. (Original size.)

of this course it is said that it is 80 miles long, "ende het is ij. daghen seylens voor die wint so vele als tschip lijden mach, maer dat schip moet geballast weesen".

If we try to determine more closely the age of the Northern parts of the "reading-map", at first sight the numerous names of places seem likely to be some guide. However, we soon find that such place-names as do not refer to towns, villages, and other places of habitation, are generally useless for the purpose. For in most cases there is no possibility of determining their age. Of inhabited places in the Scandinavian North, the "reading-map" names, besides Visby, only the eight following: Marstrand, Kungsbacka, Varberg, Falkenberg, Helsingborg, Helsingör, Dragör, and Falsterbo. Since, however, all these were already mentioned in documents before the middle of the 14th century, while the northern part of the "reading-map" is doubtless younger,

optegnet oc beschreffuen all Söens leylichhed oc skickelse . . . Alle Skippere, Styrmen oc andre, som bruge Seylatzen til vilie oc tieniste fordansket. Kiöbenhavn, LAUR. BENEDICHT, 1568. [Copy in the Great Royal Library in Copenhagen.]²

1571. *De Seekarte ost vnd west the segelen, vth den besten Piloten, vnd der besten Karten getagen vnd ys ein yder kos vp dat syne gestellet . . .* Gedrückt tho Hamborch, dorch Joachim Löw, Anno 1571. Den 10 Sep. [Copy in the Town-Library of Lübeck.]

1575. Lübeck, Johann Balhorn. [Copy in the Commerce Library in Hamburg.]

1577. Hamburg, Joachim Löw. [Copy in the Library in Wolfenbüttel.]

1588. Amsterdam, Corn. Claeszoon. [F. MULLER: *Catalogue of books and pamphlets rel. to N. and S. America*, no. 556; Amsterdam 1877.]

¹ TIELE (*Bibliogr.* p. 267) states that a "Caerte vander See", printed in Amsterdam in 1566, is in the University Library in Copenhagen. According to information from the librarian, Dr. S. BIRKET SMITH, this statement is incorrect.

² A MS. copy of this printed book, made at the end of the 15th century, is to be found in a law-code belonging to the Royal Library in Stockholm (c 79 fol.) Cf. *Norges gamle Love*, Vol. IV, edited by GUSTAV STORM, Christiania 1885, p. 691.

Of these the Dutch edition of 1566, the Danish of 1568, and the Low German of 1571 have been collated by me. They all form slightly varying revisions of a Dutch original, the first edition of which, probably now lost, seems to have been published between 1541 and 1566. The above mentioned "reading-map" of 1541 evidently formed the foundation of the work; but to this there have been added considerable supplements and enlargements in the uncritical manner already pointed out. An example of the little care taken with these revisions, is the fact that the Danish translator, LAURENS BENEDICHT, a printer in Copenhagen, did not even know how to free some of the names of places near his native town from the distortion pardonable with foreigners; thus there occur in his revision *Vardzberg* for Vardberg or Varberg, *Suederö* for Halland's Väderö, *Sederö* (and *Sirö*) for Sejrö, *Syder norden* for Söderudden (South Point of Öland), and so on; it even seems as though his revision contained no improvement founded on a more correct knowledge of the state of his own country, other than that, in the chapter which deals with the sailing through Drogden, the words of the original, "die spitse Thoren," have been changed into "Spiren paa vor Frue kircke" (the spire of our Lady's church at Copenhagen).

A novelty, which, so far as is known to me, is met with for the first time in these reading-maps, is formed by the outline-sketches there inserted. In the edition of 1566 they still only occur sparingly—for the northern district there are only three, *i. e.* Lyserort, Skagen, and Laesö—but in Laur. Benedicht's "Sökarte" they are much more numerous and better executed; here they are partly printed in the text, partly they occur on narrow paper-slips bound in or placed loosely between the leaves of the book. There are also in the latter work a number of coarsely executed special maps of ports, islands, etc., halfway between maps and outline-sketches. As an example of these the peculiar drawing of Gotland (fig. 43) is here given. On the title-page of the book there is also a small chart of north-west Europe, here given in facsimile (fig. 44). It partly reminds one of the ordinary portolan-type, but the drawing of the Scandinavian North is such as occurs in no other printed work.¹

The supplements added to the enlarged edition of the "reading-map" here in question chiefly consist in more exact descriptions of the stretches of coast already inserted in the edition of 1541, and in new course-directions for sailing in the waters there dealt with. As regards the Scandinavian North, only two entirely new districts were inserted in the later edition of the "reading-map"; these were Iceland, with its above-mentioned lists of fjords, and the west coast of Norway, from Skudesnaes in the North, past Cape Stadt, to Stemshesten and the isles of Grip and Tusteren (Toster Poster) in the neighbourhood of the present Christiansund. This latter part is, under the heading *Omme Schuytenes te kennen*, inserted before the chapter: *Hoe men in Noorweghen seylen sal*, which already occurs in the edition of 1541.

The Baltic part of the work is considerably enlarged, especially as regards the south coasts of that sea and Gotland; towards the north-east, however, Reval still forms the extreme point; and the east-coast of Sweden is despatched with the brief notice that "west of Öland Kalmar Sound bends in; there shall ye sail to Stockholm."

That such "reading-maps" or "sea-books" still towards the end of the 16th century were the only nautical aids at the command of the seafarer in the Baltic, appears from an interesting remark in a letter from Captain FRANCISCO DE ERASO, dated Stockholm, June 23, 1578. This man who had been sent by his monarch, Philip II. of Spain, on a diplomatic mission to King John III. of Sweden, sailed from Stralsund on the 20th of May in that year. It took four wearisome days to get to Bornholm, but thence the vessel was carried to Kalmar by a fair wind in 22 hours. About the latter part of the journey Eraso says: "The navigation was exceedingly dangerous and caused great terror to the sailors I had, and still greater to me, since we sailed without a chart in a sea filled with many islands and skerries. The natives never use any other chart than a small written book, which, however, only contains the sea by Germany and the coast there; there would not even have been a compass had I not brought one with me."²

The confusion gradually introduced in the reading-map by the want of method in the addition of supplements naturally made it very difficult to use. It is therefore no wonder that attempts were early made to bring its contents into a more systematic order, and also to free it from the numerous errors and contradictory statements that had crept into it in the course of time. Of works, which, though in the main based in the reading-map, yet on the whole ought to be regarded as independent compilations, the following have been accessible to me:

De zeevaart ende onderwijnsinge der gantscher Oostersche ende Westersche Zeevaerwater, door den vermaerden Pilot ende leermeester der Stuerlyden ADRIAEN GERRITZ van Haerlem . . . Tot Amstelredam Anno 1588. [Copy in the University Library in Lund.] According to the preface the author had been dead for more than eight years at the time of the printing of the book; and since there is an astronomical account for 1575 given in the nautical introduction, the time for the compilation of the work may be put down as between 1575 and 1580.

Die Caerte vande Oost ende West Zee vanden vermaerden Stuerman GOEYVAERT WILLEMSSEN van Hollesloot welcke hy dickmael hermaecht ende verbeterd heeft. Ende nu van hem ten lestenmael aldus by den anderen is ghebracht voor zijn doot, daer naer by verscheyden Stuerlyden seer vermeerderd . . . Van nieuws aen verbeterd ende vermeerderd. Tot Harlinghen 1588. [The title after TIELE.] The license to print is dated 1586; the first edition of the work, which according to WAGHENAER (*Thresoor d. Zee-vaert*, p. xi) was printed in 1587, is not quoted in TIELE's bibliography, nor is an edition of 1594, with a title literally corresponding with the above, a copy of which is to be found in the Great Royal Library in Copenhagen.

Both these works contain exhaustive treatises on the science of navigation, as well as, for the illustration of the sailing-directions, not only numerous outline-sketches, but also special charts executed as wood-cuts. As an example of these awkward attempts at producing charts, a map of the south coast of Norway from Jomfruland to Langesund (fig. 45), as well as the special chart of the mouth of the River Göta (fig. 46), are here given from ADRIAN GERRITZSOON's work. By the strange name *Nilus*, which leads one's thoughts to quite different parts of the world, is meant *Nya Lödöse*, founded in 1473 near the place where Gothenburg now is

¹ In that part the small chart mostly resembles an anonymous Portuguese portolano of the end of the 16th century, kept in the Biblioteca Vallicelliana in Rome (no. 450 in UZIELLI-AMAT's list). This portolano is not published; a drawing of this portion, in which the North is so remarkable, has been obtained through Lektor S. DAHLGREN.

² See the article "Johan III och Filip II" in *Historisk tidskrift*, VI, Stockholm 1886, p. 10.—Interesting information as to the navigation in the Baltic may also be read in the account, by the Secretary SIMON FISCHER, of HENRIK NORMAN's embassy to the coronation of Erik XIV in 1561 (*op. cit.* V, 1885, pp. 262 and 292). The prayers which, under the name of "the good word" (das gute word), were, according to this account of the journey, daily said by the sailors, are found in an almost exactly corresponding version in the Dutch edition of the "reading-map" of 1566 as well as in the Low German edition of 1571.

situated. The drawing of Bornholm and Ertholmarna (fig. 47) on the next page is taken from GOIVERT WILLEMSSEN'S work.

Finally, among works of this kind belonging to the 16th century, there is still to be mentioned one sailing-direction, which may be regarded as a supplement to the West-European sea-book. It is a direction by King James V. of Scotland (reigned from 1528 to 1540) for sailing round the coasts of his country. For Scotland is missing in the manuscript sea-books as well as in the oldest printed reading-map. That these works served as a pattern for King James' sailing-direction, is evident from the fact that this observes the same nautical division as appears to have obtained in the oldest edition of the sea-book, although, as has been said above, in the earliest MSS. now known it was no

der Zeevaerdt (1st ed. 1584) and *Thresoor der Zeevaert* (1st ed. 1592) contain sailing-directions in the text, besides nautical instructions, etc. In the first work these directions are rather brief, and are accompanied by short statements as to the trade and chief products of the various countries. Here we find for the first time in printed literature a direction for sailing along the east coast of Sweden to Stockholm. This is here reproduced from the Latin edition of the work of 1586.

Westervici circa montem Virginem, vulgo de Sweetische Ioucvrouwe, et scaræ Sueciæ initii, exacta descriptio.

Distat Calmero mons Virgo, miliaris octo ad Ypaquilonem et Aquilonem: estque Silbuy portus primus, inter Scaras, sive scopulos. A quo inter Scaras seu scopulos navigari potest in Westervicum, Flerbuy et Scel-



Die int Plus diep seplen twil die laet die Clip met de twee Warbers aen Backboort/ende die caele Clip aen Stuerboort / seplint eerst n/n/o/ ende als ghy binnen die Clippen aen Stuerboort van b/siet/soo gaet o/n/o/ ende laet alle die caele Clippen aen Backboort van b/en sepl tot voort by die tweede regel caele Clippé/ ende set dicht aen die Clippen op vü.vin.of r.vadem o/n/o/dacr af/dat is die beste reede/men mach daer by supden/ende w/f/w/ van die boortmoende Clippen mede setten op vij. of r. vadem/ende men mach tusschen die caele Clip ende het lant wel doot in Zee loopen met een f/o/ten f/ wint of f/o.

Dit is Plus diep int plat / ende ich heb dit altemael gheseplé ende gheloot / so dat ghetal int wijst/so hier nae verclaert wort.

46. Chart of the mouth of the River Göta. From ADR. GERRITZSOON'S Zeevaert, 1588. (Original size.)

longer strictly carried out. The Scotch work is printed as an appendix to GEORGES FOURNIER'S *Hydrographie* (Paris 1667) with the title: *Navigations du Roy d'Escoce Jacques cinqviesme du nom, autour de son Royaume, & Isles Hebrides & Orchades, sous la conduite d'Alexandre Lyndsay, excellent Pilote Escossois*, and probably also in other works.

A new period in the history of sailing-directions as well as in that of charts begins with LUCAS JANSZON WAGHENAER of Enkhuysen. His two celebrated works *Spiegel*

scuer; iter enim navale a scopulis immune. Distant Monte Virgine Stocholmæ ostia, miliaris decem et octo, et navigatur ad Aquilonem, vergitque Stocholmæ terra ad Cæciam. Ostia vero introrsum tendunt, primum ad Mesaquilonem, deinde ad Aquilonem in Durhauiam: relinquiturque rupes, vulgo de Wigsteen, ad navis sinistram: rupes vero media, ad dexteram. Quæ vero Vacca rubra, vulgo de Roode Coe, miliaria duo intro ab ostiis sita. A Durhavia vero tendunt Stocholmæ ostia introrsum, ut plurimum ad Borrolibycum, Ypocorum et Mesocircium, Wichholmam usque. Intra Scaras Westervici, ubique fundus est anchoris figendis commodus, sedecim et viginti orgyiarum altitudinem continens.

Mons Virgo is of course the rocky island, Jungfrun, in Kalmar Sound, and Viksten, Röko, and Djurhamn are still well-known names of places on the south entrance to Stockholm. The same is the case with Karvasen, Mellsten, and

Gunnarstenarna, which are also found on Waghenae's chart of the coast of Sweden, here given in facsimile (fig. 48). On the other hand it has not been possible to find out what was meant by Silbuy, Flerbuy, and Scelscuer, places situated among the skerries of Småland and Östergötland which are very incorrectly drawn on the map. An explanation of the Latin names of the cardinal points is given by the compass-rose introduced on the map.

Waghenae's "Thresoor", on the contrary, contains far more comprehensive and detailed sailing-directions.

As regards the source of these, the work contains a statement which to Scandinavians seems to be of specially great interest. The title-page itself of the work says that it contains: *het oude vermaerde Lees-caertboek van Wisbuy vermeerderd ende van ontallijcke fouten en valsche coersen ghesuyvert*. Any book containing sailing directions that claims

a bank lies in the sea at a depth of 14 fathoms, and that the bottom there is white and gray sand, and further it is said: After having passed there, you find no bottom at 14 fathoms. These 14 fathoms ought to be 40 fathoms. Besides you find on the 62nd sheet that it is said that the shallow off Falkenberg extends southward to Holland, which is impossible considering that Jutland lies right across between. But this Holland must be Halland, which projects in a point behind Väderö (het Eylandt van Swedercur). The promise made in his preface to give further accounts of the chief mistakes in the Visby sailing directions the author also fulfils by giving on pp. ix—xi an index to these mistakes, not only with reference to the sheets of the work examined, but also with a statement whether the mistakes are found in the sections printed in large or in small type; the latter parts, he says, have been added 4 or 5 years ago—that is to say in 1587 or 1588—and are ascribed to GOIVERT WILLEMSZON van Holesloot.

I have not been able to find any work with which Waghenae's accurate quotations agree. That he did not refer to the first two editions of 1587 and 1588 of GOIVERT WILLEMSSEN's work, which I have not had access to, is shown by the fact that he subjects this work to a still more minute scrutiny in a special chapter, after which there follows further a list of the mistakes in the above-quoted book by Adrian Gerritszoon. If, however, we compare Waghenae's remarks with any of the above-quoted editions of the "reading-map" we soon find a correspondence, which in several places is almost literal. So for instance the piece quoted in the preface about a bank on the east-coast of Gotland runs thus:

Dutch edition, 1566: ende oock hebby daer by eene Banck by Oosten, van veerthien Vadem diep grau widdt sandt, ende als ghy daer ouer zijt, daer en hebt ghi gheen en gront op veertich vadem.

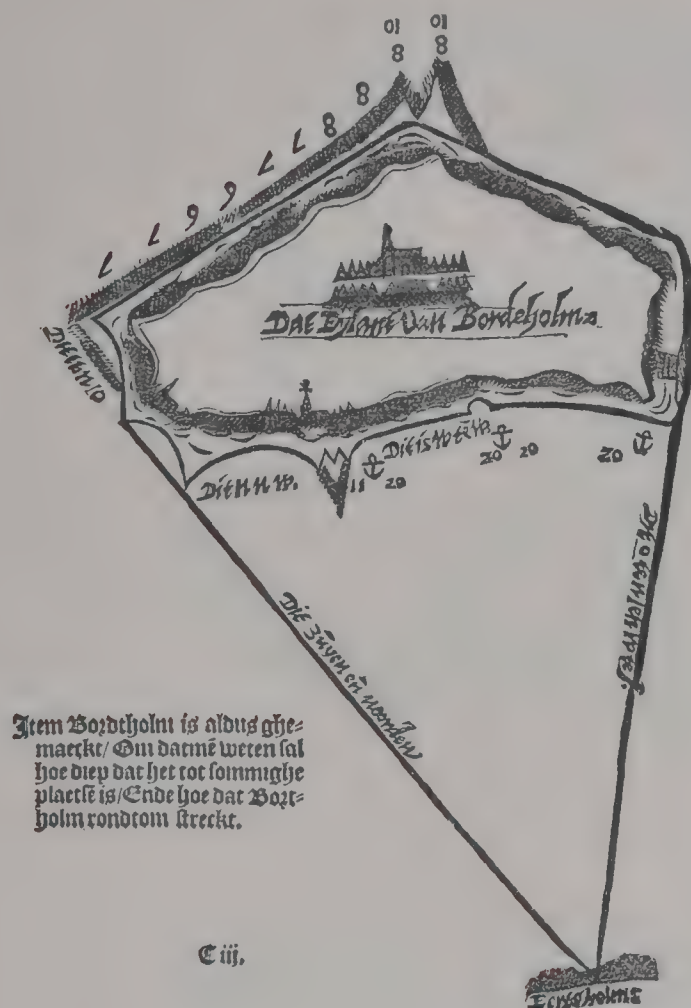
Danish edition, 1568: End haffue i ocsaa en bencke østen for, paa xiiij. fauffne dyb, hvid graat sand, Oc naar i ere der offuer, da haffue i ingen grund paa xl. fauffne.

Low German edition, 1571: vnd beosten ys noch eine bancke van xiiij. vadem deep, graw sandt, vnd wen gy darauer synt, dar hebbe gy nene grundt op xl. vadem.

It is true that in none of these cases is there the mistake of 14 instead of 40 fathoms, but in other respects the correspondence is complete. The confusion of *Holland* and *Halland*, on the contrary, occurs in all these editions. Thus there seems to be no doubt that Waghenae, by the "Lees-caertboek van Visby", meant the above mentioned "reading-map", and that he had before him some Dutch copy of it, probably printed in 1587 or 1588, to which GOIVERT WILLEMSSEN had added some new supplements.

It remains to be explained how this book, the Dutch origin of which is obvious, could be named after Visby.

KOPPMANN (*Das Seebuch*, p. vii) has already pointed out that all the known editions of the Low German reading-map are accompanied by copies of the so called "Visby maritime code", and from this he has drawn the conclusion that it was the general habit to join these two works in one volume for the use of navigators on board ship. The correctness of this supposition is confirmed by the fact that the Dutch edition of 1566 of the reading-map also is accompanied by the Visby maritime code; and the same was probably the case with the edition of 1588, judging from the fact that in the same year and by the same printer an edition of this maritime code was published.²



47. Bornholm with Ertholmarna. From G. WILLEMSSEN's *Caerte vande Oost ende West Zee*, 1594. (Original size.)

to originate from Visby is, however, sought in vain. But that Waghenae's statement cannot be altogether mistaken, and that the above-quoted words refer to a printed work which he really had access to, is shown by an expression in his preface "Aen den goetwillighen Leser". He says, in fact, that he hopes that his own work will be more useful than ever was "the celebrated city of Visby's very celebrated map-reading-book, which, through great carelessness and misunderstanding in copying as well as in printing has become quite spoilt and falsified. This," he continues, "I shall clearly prove by examples. First it is said on the 76th sheet, among other things, that between Hoburg and Östergarn in Gotland

² See C. J. SCHLYTER: *Sveriges gamla lagar*, Vol. VIII, p. LXVI. — Other maritime codes than that of Visby have been joined to different reading-maps; thus we find that the previously quoted *Rutter of the Sea* is accompanied by "les Rôles d'Oleron" in an English translation; and to *die Kaerte van dye Suyder zee* is joined the Amsterdam maritime code, which here bears the title: *Die ordinancie dye die ghemene schipperen stuurmannen boetsgesellen ende cooplieden mit malcanderen begherende van schiprechte datmen in Holland, Zeeland, Vlaenderen houdende zijn*.

On account of this it seems probable that it was from the Visby maritime code that the reading-map borrowed the name it bears in Waghenaeer. But how far a book under the title "Visby map-reading-book" really existed we are not in a position to decide, since no copy of the work quoted by Waghenaeer seems to have been preserved. Now, however, Professor C. J. SCHLYTER has proved on conclusive evidence that "what is called the Visby maritime code does not contain anything but excerpts from the laws of Lübeck and translations of the Flemish and the Amsterdam maritime codes;" and as regards the origin of the name, which is found first in 1505, he has put forward the hypothesis that merchants and skippers "at a meeting in Visby for common examination and general approval presented the laws of navigation in force in their own countries, which subsequently as a collection, although not as a complete whole, received the name of the Gotland maritime code." Since then the claims of Visby to the celebrated code have no firm foundation, there should be still less authority for connecting the name of the town with the map-reading-book, the development of which from Flemish, or perhaps still more distant, sources we have here attempted to trace.

Returning to the sailing-directions in Waghenaeer's *Thre-soor*, we find, as regards the North of Europe, with which we have here been chiefly occupied, various important novelties which did not occur previously in literature of this kind. Thus the Shetlands and Faeroe Islands, together with the White Sea and the coasts of North Russia as far as Waigatsch and Novaja Zembla, are more minutely described. Here, says the author, one might perhaps be able to sail to the rich lands of China by a route a quarter as long as the one which the Portuguese have to take round the Cape of Good Hope. The exhortation in the words: "Dit wil een yeder coopman ter herten nemen ende bedencken om eenmael met ernst dese passage aen te vanghen", was, as is well-known, followed not long after by Waghenaeer's countrymen.¹ The information about these northern countries is of special interest since it is based on statements by OLIVER BRUNEL, about whose little known journey to Novaja Zembla Waghenaeer's work contains some statements hitherto unnoticed.²

The detailed description of the coasts of Scandinavia begins at Trondhjem,³ and continues, with many interesting particulars which space does not permit us to dwell upon, to Stockholm. Here for the first time in nautical literature

the Åland Sea and the Gulf of Bothnia are mentioned, the latter however is despatched with the short information that it stretches so far up in Finland that a ship with fair wind can hardly reach its end in five days. Waghenaeer further gives the first directions for sailing to Åbo, as well as along the south coast of Finland to Viborg and the mouth of the Neva, beyond which he is also acquainted with the stronghold of Nöteborg (now Schlüsselburg) and the large lake Ladoga (Lading).

It does not lie within the plan of this account to follow the history of sailing-directions during the 17th century and in later times. Here it can only be mentioned that the oldest work of this kind that undoubtedly is of northern origin, is the following:

Een Siö-Book, som innehåller om Siöfarten i Östersjön . . . The Enfaldigha Siöfarende til tjänst, Vnderwijssning och Rättelse, kortelighen sammansatt aff JOHAN MÅNSSON, Styrman. Tryckt i Stockholm aff Ignatio Meurer år 1644.

The author, who was "master-pilot of the admiralty" and fell on board the "Leopard" at a sea-fight in the Sound in 1658, has compiled the above-mentioned work on a perfectly independent basis. Starting from "Swenske Sandhamn," the well-known main entrance to Stockholm, he describes clearly, and with an accuracy bearing witness to great experience, all such routes to the leading places of the east and south Baltic as were of importance to the Swedish naval officer during the height of the Swedish power. Of the excellence of the work the numerous editions and translations are evidence. The 2nd Swedish edition, prepared by JACOB JÖRANSSON FORS, was published in 1677; the 3rd, revised and improved by MAGNUS OTTO NORDENBERG,⁴ in 1725. In 1748 the work appeared for the last time, revised and added to by the naval Captain JONAS HAHN, with the strange title: *Den Namnkunnige Älder-Styrmannens Johan Månssons uplifwade aska, eller des förnyade sjömärkesbok*. In German John Månsson's sea-book has been published at Wismar in 1669, Lübeck 1695, without place of publication in 1710, Lübeck 1717 (3rd edition), Lübeck 1735 (4th edition), and Lübeck 1760 (6th edition). Finally it may be mentioned, that there was a Danish edition printed in Copenhagen in 1735 translated from the last Swedish as well as German edition.

¹ Among his friends was the celebrated arctic traveller JAN HUYGHEN VAN LINSCHOTEN. See *Bibliotheca Belgica* W. 47, 6.

² Cf. NORDENSKIÖLD, *The Voyage of the Vega*, I: p. 235.

³ The coast between Vardöhus and Trondhjem is treated of only with the greatest brevity in the chapter which bears the heading "Vande streckinghe van verscheyden landen". — A catalogue-like, but rather more detailed, coast-description between Bergen and St. Nicholas on the Murman coast is to be found in a 16th century MS. (K. 29) in the Royal Library at Stockholm.

⁴ Born in 1705, younger brother of ANDERS JOHAN and CARL FREDRIK NORDENBERG, the progenitors of the Nordenskiöld family. In his youth he proved guilty of some impropriety, which caused him to enter Russian service. Here, however, he soon made himself intolerable by advocacy of "eternal peace"; he was arrested and handed over to the Swedish government, which called him to account for his behaviour during the war. After having been imprisoned for several years, he was set free, and spent his remaining days on his brothers' estates in Finland. He died in 1756. See A. E. ARPPE: *Anteckningar om finska alkemister (Bidrag till kännedom af Finlands natur och folk, Häft. 16, Helsingfors 1870, p. 93 et seq.)*.



49. Hielgoland. From *Caerte vander See*, 1566



50. Map of the world from a MS. by BUONDELMONTE, before 1481. Royal Library, Berlin. (Original size.)

XII.

The discovery and charting of the ocean-coast of Africa.

Just as Pytheas' voyage of discovery was a starting-point for the knowledge of the Mediterranean peoples concerning the countries north of the Pillars of Hercules, so the periplus of Hanno may be regarded as a starting-point for their knowledge of the Atlantic coast of Africa. Both, however, had had their predecessors. On the one hand Carthaginian sailors before Pytheas are thought to have been at least as far as England. Flourishing Carthaginian colonies were early founded on the west coast of the Iberian peninsula, and in ancient literature there is at least one Carthaginian voyage of discovery or colonization mentioned, under Himilco, to the parts of Europe situated beyond the Pillars of Hercules (PLINY, II: 67; FESTUS AVIENUS, *Ora maritima*: 117, 383, 412). On the other hand, there can hardly be any doubt that Africa was circumnavigated by the Phoenicians, also that these or other navigators of the Mediterranean penetrated beyond the Pillars of Hercules along the coast to the south long before Hanno. The very voyage of Hanno proves that at least the coast to the north of Kerne was well known to the Carthaginians before they set out on their voyage, for one does not send a fleet with 30 000 settlers to countries that *have not yet been discovered*. To these predecessors, however, there are but vague allusions in the writings of the ancients. In another respect, too, there is a remarkable resemblance between the voyages of Pytheas and Hanno. Nearly two

thousand years elapsed before sailors from the Mediterranean penetrated beyond the ice-covered *Ultima Thule* of Pytheas, and there was a long wait before the "caravels" and "galleys" of Prince Henry the Navigator sailed past the sun-parched land in the south, where Hanno was forced to turn.

If the statements concerning the number of people and vessels engraved on Hanno's votive pillar be correct and correctly deciphered, then his voyage of colonization and discovery is perhaps the grandest enterprise of the kind ever attempted. The account of Hanno's periplus is the oldest, and next to that of Nearchus the most complete description of an ancient naval expedition that has been preserved to us. It long formed our only source of information concerning a part of the world situated immediately on the frontier of the civilised peoples' own territories, and the only sailing-direction for the north-west coast of Africa during the first fifteen centuries after the destruction of Carthage, if indeed there was any navigation of these waters during that time at all. I shall therefore reproduce the short account *in extenso*. It is said to have been engraved on a votive pillar in a Carthaginian temple. During the Punic wars it was copied and translated into Greek. This Greek translation, together with several other Greek works, is to be found in a parchment-codex, which is now preserved in the library at Heidelberg. After having been published in print in Basel in 1533,

it has been the subject of a number of new editions and commentaries by Conrad Gesner, Abraham Berkelius, Pedro Rodrigues Campomanes, Henry Dodwell, Thomas Falconer, Fr. Wilh. Kluge, Carl Müller and others. The following translation is based on the Graeco-Latin edition of the latter (*Geographi graeci minores*, I, pp. 1—14, Parisiis 1855). Müller considers it probable that Hanno's voyage of colonization and investigation was undertaken towards the end of the 5th century B. C., or about 470. It is often mentioned by classical authors.

Hanno's, the King of the Carthaginians, circumnavigation of the parts of Libya that lie beyond the Pillars of Hercules.

1. It seemed good to the Carthaginians that Hanno should sail beyond the Pillars of Hercules and found Liby-phoenician cities. And he set sail at the head of sixty fifty-oared vessels, and a multitude of men and women, to the number of thirty thousand, with provisions and the rest of their equipment.

2. After having put out and passed the Pillars and sailed beyond them two days' journey we founded the first city, which we named Thymiaterium. Below this there was a great plain.

3. And then putting out westwards we met at Soloeis, a Libyan promontory thick with trees.

4. Having there erected a shrine of Neptune, again we held on towards the rising sun for half a day, till we arrived at a mere, lying not far from the sea, filled with many great reeds. And in it were elephants and other wild beasts, grazing in great numbers.

5. And having passed by this mere as much as a day's sail, we left settlers in the sea-towns that are called Karikon teichos, Gytte, Akra, Melitta, and Arambys.

6. And having put out thence, we came to Lixus, a great river, flowing from Libya. Beside it certain nomads, the Lixitae, tended their herds. And with them we stayed for some time, since they were friendly.

7. But above them there lived inhospitable Ethiopians, who occupied a country filled with wild beasts and traversed by great mountains, from which, they say, the Lixus flows. And round these mountains there live men of a different form, the Troglodytes, who are swifter than horses in their course, said the Lixitae.

8. And having taken interpreters from the latter, we sailed along by the desert towards the meridian for two [twelve?] days, and thence towards the rising sun a day's course. There we found in the inmost part of a bay a small island with a circumference of 5 [15?] stadia; on this we left settlers, naming it Kerne. From our voyage we supposed it to lie opposite Carthage, for the voyage from Carthage to the Pillars was as long as from the Pillars to Kerne.

9. Thence we came to a mere, sailing along a great river, by name Chretes. This mere had three islands, larger than Kerne. At the end of a day's sail from these we came to the inmost part of the lake, above which there rose huge mountains full of savages clad with skins of wild beasts. These drove us off by throwing stones, and prevented us from disembarking.

10. Sailing thence we came to another river, great and broad, filled with crocodiles and hippopotami. Turning back from there we came up again to Kerne.

11. And thence we sailed towards the meridian for twelve days, hugging the land, the whole of which was inhabited by Ethiopians, who fled without waiting for us. And their language was unintelligible even to the Lixitae who were with us.

12. And on the last of these days we came to an anchor by great wooded mountains. And the wood of the trees there was sweet-smelling and of various kinds.

13. Sailing round these mountains for two days, we found ourselves in an immense gulf of the sea, the shore of which on the other side was a plain, whence in the night we now and again saw fires breaking out on all sides, now more, now less.

14. Having watered we sailed ahead from there along the shore for five days, till we came to a great bay which the interpreters said was called the Horn of the West (*Ἑσπέρου κέρας*). In this bay was a great island, and in the island a lake like a sea, and in this another island. Landing on this we saw by day nothing but forests, but by night many fires burning, and heard the sound of pipes, and the beating of cymbals and drums, and infinite shouting. Fear therefore seized us, and the seers charged us to leave the island.

15. Quickly then sailing out we passed by this red-hot smoke-filled country, whence huge fiery torrents cast themselves into the sea. And the ground could not be trod upon for heat.

16. From here too we quickly sailed away in fear. After four days' voyage we saw in the night a land full of flame. And in the midst was one lofty fire, greater than the others, grasping, it seemed, at the stars. But this by day appeared a huge mountain, which is called the Support of the Gods (*Θεῶν ὀχημα*).

17. Sailing thence for three days by fiery torrents we came to a bay, called the Horn of the South Wind (*Νότου κέρας*).

18. In its inmost part was an island, like to the first, containing a lake; and in this was another island full of wild men. Far the greater number of them were women with hairy bodies. The interpreters called them Gorillas. We pursued them but could not catch any of the men, for they all escaped, climbing precipices and defending themselves with stones. But we caught three women, who would not come with their leaders, but bit and tore them. We killed them, however, and skinned them and took the skins away to Carthage.¹ For we did not sail any further, since our food gave out.

In the attempt to lay down Hanno's voyage on a modern chart, direct use cannot be made of the sailing-times given in the account. These evidently, especially as regards the two journeys southward from Kerne, were governed by conditions independent of the distances traversed. Nor ought one, in such an investigation, to scrutinize all the islands marked on modern charts along the north-west coast of Africa, in order to identify any one of them with Kerne, the goal of the colonizing enterprise and the starting-point of the actual exploration. This island was evidently very insignificant, with a circumference of 5, or perhaps 15, stadia (0.5 or 1.5), and situated 8 stadia (0.8) from land. During the thousands of years that have elapsed since the time of Hanno, such an islet in these sandy regions would undoubtedly have become joined to the mainland through the silting up of the strait. Even with more complete knowledge than we at present possess of the conditions of the land on the north-west coast of Africa, it would therefore be difficult to tell where the former islet was situated. But the situation of Kerne is given, on the other hand, with fair accuracy by the statement that the distance from Kerne to the Pillars was as far as from these to Carthage.

Comparison of the statements of distance in Scylax with the real distances, and examination of the measurements on the normal portolano, such as was carried out in chapter IV, prove that the old skippers were well trained in the art of estimating distances in sailing. Before the invention of the log such readiness was absolutely necessary for a skilful skipper.

¹ PLINY says (VI: 31), that these skins were hung up in a temple of Juno, where they still were at the conquest of Carthage.

It was part of his professional education. The statement that Kerne and Carthage lay at equal distances from the Pillars of Hercules should therefore be quite trustworthy. In that case Kerne was situated in the proximity of Cape Bojador, possibly near the swamps inundated at high water and called Rio d'Oro on old maps. The great forest-clad mountains that, on the second voyage from Kerne, were reached after twelve days' rowing or sailing, were evidently situated on the point that is now called Cape Verde. The gulf situated two days' journey to the south finds its only equivalent in the mouth of the River Gambia. Major places 'Εσπέρον κέρας at the mouth of the river Geba; and the high mountain that was met with after four days' rowing from this place, Major considers to be the conical mount Sagres at the mouth of the River Sangaria (9½° N.). The important island Νότου κέρας situated near the shore, was probably the island which on modern maps is denoted by the name Sherboro; it is the only island that occurs on the part of the west coast of Africa here in question. For the interpretation of the flames and streams of fire that were visible in the neighbourhood of the turning-point, I must refer to MAJOR'S *Prince Henry* (1st edition, London, 1868, p. 94). It seems most probable that the fabulous passages in this part of Hanno's narrative are to be explained partly by fires kindled by the natives in order to avert the evil spirits that approached their coast, partly as errors in the first translation of the Punic original.

In Tabula quarta Africae in Ptolemy's atlas occur the following names borrowed from Hanno's narrative:

Ptolemy.	Hanno.
Κέρνη	Κέρνη
Σολομεντία ἄκρα	Σολοεῖς
Τράχιος ποτ.	Χρέτης
Ἐσπέρον κέρας	Ἐσπέρον κέρας
Θεῶν ὄχημα	Θεῶν ὄχημα

Ptolemy's Kerne has a situation quite different from that of Hanno's, a fact that should cause no surprise, since Kerne, even by the time of Pliny, had become a mythical island, "cujus neque magnitudo, neque intervallum a continente constat" (VI: 31). The island was evidently too unimportant to be kept in memory. Moreover the description of the country and the abundance of legends in Ptolemy show that for this part of the coast of Africa he had access to original MSS. unknown to us, or to original communications from Atlantic skippers. Thus navigation to these parts seems to have been continuous from the time of Hanno to the 2nd century A. D.

On the other hand, among the names, nearly 50 in number, that occur on the north-west coast of Africa in portolanos of the 14th century, there is not one that can be identified with the names found in Hanno or in Ptolemy. Thus it seems as though a break in the communication between this stretch of coast and the countries of the Mediterranean had taken place from 200 to 1200 A. D. Navigation probably stopped altogether during the first centuries of the extension of the Arabian power, or perhaps before that, when Africa was taken by the Vandals.

Out in the ocean, south-west and west of the Pillars of Hercules, at a distance of 400' to 1000' from Gades lie the Azores, the Madeira group, and the Canary Islands. In the history of geographical discovery these islands played an important part, owing to their situation far beyond sight of land, immediately on the highway round Africa to the East Indies and

across the ocean to the West Indies. Moreover, their mild and delightful climate, their rich vegetation and their remoteness from the horrors of war, have given them from time immemorial a very prominent place in the dreams of bliss of popular imagination, in the world of poets' fancy, and in the romantic descriptions of story-tellers. The date of their discovery is unknown. They are not mentioned in Hanno's Periplus,¹ but it is none the less probable that they were early known and visited by sailors that were stormdriven from the highway along the coast out into the ocean. Allusion is made to this in various classical authors, Theopompus, Plato, Aristotle and others. In Plutarch's life of Sertorius (died in 72 B. C.) we read that this warrior, during his flight from his victors, met at the mouth of the Baetis some skippers who had recently come from two islands in the Atlantic Ocean 10 000 stadia distant from the coast of Africa. They described the mild equable climate of the islands and their fertile soil in such vivid colours, that the old soldier was seized by longing to go there away from the battles and strife of the Old World.

Subsequently there is a description of these islands in Pliny (VI: 32), partly after Statius Sebosus, partly after Juba the younger. Besides the two Hesperides or Purpurariae, *i. e.* the islands now called Forteventura and Lanzarote, Pliny enumerates (after Sebosus) Junonia, Pluvialia, Capraria, Convallis, and Planaria. Juba the younger, after his return to Mauritania from Rome, where he had devoted himself not without success to literary occupations, equipped an expedition with special intent to disperse the mystical darkness in which the ocean remained enshrouded. In the description by Juba quoted by Pliny, six islands situated beyond Purpurariae are spoken of: Ombrios, two with the name of Junonia, Capraria, Nivaria, and Canaria. The latter name is still used for the whole group of islands as well as for the most important one among them. Nivaria, with its high snow-covered mountain, is evidently Teneriffe; Ombrios, distinguished by a lake in the middle of the island, is Palma with its crater-lake;² Junonia is identified with Gomera, and Capraria with Ferro, both with good reason.

These islands, moreover, are mapped in Ptolemy's Atlas, on the general map of the world, and on the tabula quarta Africae. The whole group of islands is called Insulae fortunatae; the different islands are named Aprositus, Junonis (on the map of the world, Here), Pluitala, Casperia, Canaria, Pintuaria.

All these names evidently refer to the Canary Islands, which are nearest to the coast of Africa. There is no sure proof that the Azores were known to the Phoenicians, Carthaginians, or Romans, even though the discovery of coins in Corvo, one of the islands of the Azores situated furthest out in the ocean, suggests that this was, at least occasionally, visited by Carthaginians.

Apart from the revisions of the old classical stories made by some Arabic authors,³ the first thirteen centuries of our era yield no further information as to a communication by sea between the Atlantic islands and Europe, though it seems probable that voyages to them never completely ceased.

In fact, long before the time of Bethencourt and of Henry the Navigator, these islands were, as the following table shows, not only marked on various portolanos or skipper-charts (*cf.* fig. 51), but also enumerated in the remarkable description of all the countries of the earth, which Bethencourt received from a mendicant friar before his departure for the Canary Islands, and which was rediscovered some time ago.⁴

¹ On p. 111 of the edition of Mercator's Ptolemy, which was published by I. HONDIUS at Amsterdam in 1605, Kerne is identified with Porto Santo, clearly, however, without a shadow of reason.

² This seems to be marked on various portolanos *e. g.* by Andrea Bianco (1448) and Benincasa (1467).

³ For the accounts of the regions by Arabic geographers, reference must be made to the works by LELEWEL and SANTAREM quoted above.

⁴ Jean de Bethencourt (died 1425) was a Norman baron whose castle was destroyed in the war between France and England at the end of the 14th century. For this reason, and out of liking for "knightly adventures", he decided to seek his fortune in foreign countries. To this end he fitted out a

Islands in the Atlantic Ocean, mentioned in works of the 14th and the first half of the 15th century.

<i>Conoscimento de todos los reynos etc.</i> 14th century.	<i>Atlante mediceo</i> 1351.	<i>Soleri circa 1380.</i>	<i>Soleri 1385.</i>	<i>Combittis' portolano.</i> Beginning of 15th century.	<i>Andrea Bianco</i> 1436.
isla de los cueros marinos	insule de ceruis marinis	insula de li corui marin	insula de corui marini(?)	y di corui marini	corbo marinos
ysla de los conejos		liconigi	liconigi	liconigi	coriios
isla de sant jorge			san zorzo	sco zorzi	y:a de sanzorzi
isla de la ventura	insule de uentura siue de colombis	[insule] de uentura	insule de uentura		y:a de bentusta
columbaria			columbis	licolonbi	y:a dicolonbi
isla del brasil	I. de brazi	insula de brazir	insula de brazir	y de brazil	y:a de brasil
isla de las cabras	insule de cabrera	capraria	capraria	caprara	chapisa(?)
isla del lobo		louo		louo	lobo
puerto santo	porto sco	porto santo	porto san[io]	porto santo	porto santo
lecmane	I. de lolegname	insula de legnami(?)	insula de legnami	y de legnami	y:a de madera
isla desierta	I. deserte	insula deserta	insule deserte		y:a dextera
saluaje		insule saluatgie e deserte	insule saluatgie	y saluaze	
araguaia		[insula sci br]andani	insula . . . brandani		
gresa		graciosa		graziosa	graciosa
alegranza	lalegranza	laregranza	laregranza	laregrazia	
rachan		sca clara		roco	
bezimarin		rocho			
lanzarote	I. de lanzaroto	insula de lanzaroto	insula de lanzaroto	y de lanzaroto	y:a de lancilotto
uegimar	I. de uegimarin	maloxelo	maroxelo	maloxeli	
forte ventura	I. de forte uentura	luegimarin	uegi marin	y de uegi marini	paruego
canaria	canaria	forteuentura		forteuentura	forte uentura
tenerifz		insula de canaria	insula de canaria	y de canaria	y:a de chanaria
isla del infierno	linferno		insula	y de inferno	y:a de inferno
gomeria	cerui		insula		y:a de gomiera
	I. de liparme				y:a de le palme
isla de lo fero	I. senza uentura				y:a delfero

The table shows that at least before the middle of the 14th century, and probably far earlier, Catalan and Italian skippers were perfectly acquainted with, not only the Canary Islands, but also the Madeira group and the Azores, and that most of these islands were already then denoted by the names that they still bear. This fact has already been pointed out by P. AMAT DI S. FILIPPO (*I veri scopritori delle isole Azore*, in *Boll. d. Soc. geogr. ital.* 1892), with the corollary that the first discoverers were Italians. The latter assertion, however, is far from proved. They are more likely to have been Catalans, or skippers from the west Mediterranean, apart from their nationality.

Attempts have been made to refer the discovery of these groups of islands to certain definite voyages, concerning which more or less obscure facts have been dragged from the recesses of the archives. Thus we know that two brothers, Ugolino and Guido Vivaldi, in 1291 started from Genoa with two well equipped galleys in order to seek a route to India round Africa.¹ They never returned. One of the vessels seems to have penetrated as far as the Senegal, where the sailors were kept by the natives, and where descendants of them were found by Cadamosto's companion Usodimare in the middle of the 15th century. The names which some of the Canary Islands still bear are probably

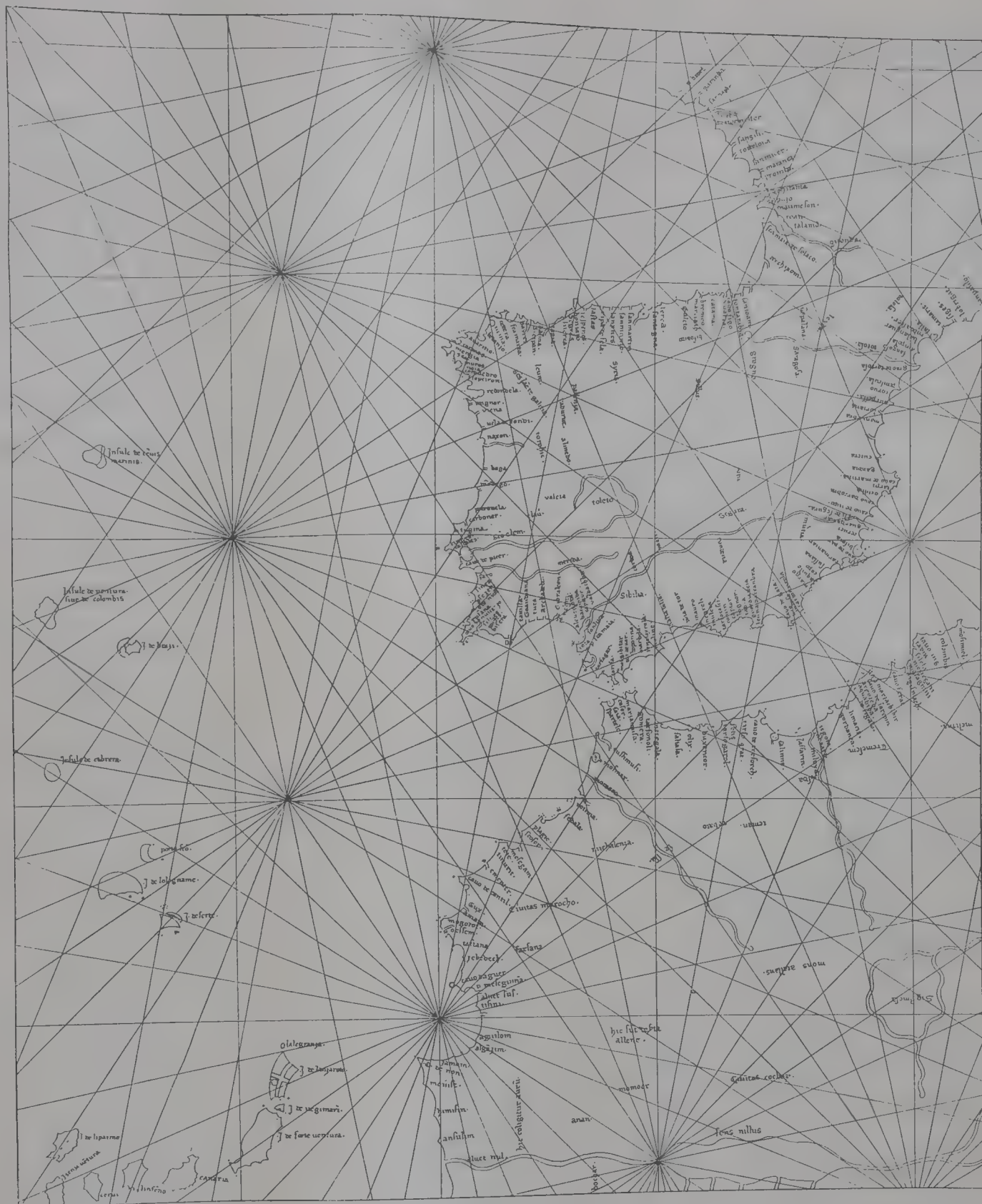
derived from this voyage. Tedisio Doria took part in its equipment. Two of his galleys were registered in a legal document of 1291 under the names St. Antonio and Allegrancia. The latter probably gave name to one of the Canaries: *Allegranza*. A Genoese colony in Lanzarote was also probably founded at that time. At any rate on most portolanos, even late in the 16th century, this island is marked with the red cross of Genoa. An adjacent island, Maloxelo, bears the name of a celebrated patrician family in Genoa.²

On the Catalan Atlas of 1375, farthest down in the southwest corner, there is drawn an open boat, with an inscription stating that Jacques Ferer's vessel set sail for the gold river (riu de lor) on St. Lawrence's day (the 10th of August) in 1346. The same voyage is spoken of in an old note, found by Gråberg af Hemsö in the archives of Genoa, and containing further information about the gold river. The accounts of this river seem during the 14th century to have had as dazzling an influence on the navigators of the west Mediterranean as *the Eldorado* and the *Spring of Youth* exercised on the Spanish conquerors in the New World. There can be hardly any doubt that the ship-drawing on the Atlas Catalan is in the main part correct. It may therefore be worthy of mention that even in my time Norwegians on Spitzbergen went out fishing in large

fleet, in company with the knight Gadifer de la Salle, with the determination of conquering the Canary Islands, which he had received as a fief from the king of Spain. He succeeded in his enterprise (1402—1406), treated the natives well, and returned after some years to France, leaving a nephew behind as feudal lord of the conquered country. But the most remarkable thing in connection with this little invasion, whereby it has obtained a special place in the history of geography, is the fact that there is an exhaustive account of it in a highflown style written by the two historians of the expedition, the friar Pierre Bontier and the priest Jean le Verrier. Their work (*Livre nommé Le Canarien*) was printed for the first time in 1630 in Paris by PIERRE BERGERON. In 1872 R. H. MAJOR published in the *Hakluyt Society's Proceedings* a new edition with the original French text and an English translation, together with explanatory notes. In chapter LV of *Le Canarien* the description here in question is referred to (*Conoscimento*, etc. *vide supra* p. 79). It does not contain the quotations and plagiarisms from classical authors so common in the literature of the Middle Ages, and is perhaps partly based on original observations. But there is no reason to believe that the Franciscan himself made all the voyages spoken of in *Conoscimento*. In that case he would have been the most far-travelled man in the world, at least up to the era of steam.

¹ A. GIUSTINIANI: *Castigatissimi annali . . . della repubblica di Genoa*, Genoa 1537, fol. CXI verso. Usodimare's letter was first noticed by GRÅBERG AF HEMSÖ. For the newer literature about Vivaldi's voyages I must refer to PESCHEL: *Geschichte der Erdkunde*, p. 179, München 1865; P. AMAT DI S. FILIPPO: *Studi biografici e bibliografici etc.*, I, Roma 1882, p. 77; G. H. PERTZ: *Der älteste Versuch zur Entdeckung des Seewegs nach Ostindien* (Festschrift), Berlin 1859.

² According to D'AVEZAC. Cf. the introduction to the above-quoted edition of *Le Canarien* by MAJOR.



51. Part of the Atlantic Ocean. From *Atlante mediceo*, 1351. (Original size 0.495 x 0.30 m.)

undecked boats, somewhat like that of Ferer. The going out and coming back across the open sea was considered dangerous, but the hunting expeditions along the coasts of Spitzbergen, in many places perfectly open, were thought agreeable, safe, and profitable. The crews of these boats were named "freebooters" by the other fishermen, who proudly looked down on them from their small decked barks.

In the time of the English King Edward III, or, according to Galvão, in the middle of the reign of Peter IV of Aragon (1336—1587), and therefore about 1365, a young man, Robert Macham, Machin, or Mac Kean, together with his sweetheart Anna Dorset, with whom he had eloped from her parent's home, was on his flight from England to France stormdriven to Madeira, where the couple pitifully

perished under romantic circumstances, which different authors have related in different ways. On account of this, Macham has been considered as the discoverer of Madeira. It is thought certain that the final enrolment of the island among the known islands of the globe by the retainer of Prince Henry, João Gonsalves Zarco about 1420, rested on information given by one of the companions of the unfortunate Macham.¹ But that here too discovery by sailors had preceded Macham's adventure, is proved by the fact that the isles of Porto Santo and Madeira (I. de Iolegname) were already inserted in the *Atlante mediceo* of 1351 (see fig. 51).

In 1364 the Guinea-coast was visited by sailors from Normandy, who there founded a colony or depot called

¹ A detailed account of Macham's discovery of Madeira is given by R. H. MAJOR: "The life of Prince Henry", 1st edition, pp. 67 *et seq.*, London 1868.

Petit Dieppe; and thither trading-vessels went from Normandy during some decades.¹

Between 1402 and 1406 took place Bethencourt's voyage of discovery, well known through the historians whom the ambitious knight took with him.

Though the Azores were already enumerated in the above-mentioned *Conosimientto* of the 14th century, it is often stated that they were discovered in 1445 by a burgher of Bruges, Josua van den Berge. It is on account of this that, on the title-page or in the text of some charts or maps of the 17th century, the Azores are called *de Vlaemsche Eylanden* ("The Flemish Islands"), e.g. Dutch WAGHENAER, Amsterdam, Cornelis Claesz., 1600; English WAGHENAER, oblong folio, Amsterdam 1612; WILLEM JANSZ. BLARUWS *Zeespiegel*, Amsterdam 1627; *Atlas major sive Geographia Blaviana*, IX, Amstelaedami 1662, p. 104.

For further details concerning the history of discovery of the Atlantic islands, the first halt on Columbus' road of discovery, I must refer to the works of d'Avezac, Major, Peschel and others. Once more, however, it must be repeated that all these islands, as the above table shows, were well known, at least to skippers, long before organised hunting and plundering expeditions were sent to them by great feudal lords. No claims to discovery, therefore, can be made for these latter whose acts and deeds can seldom win our undivided admiration. It were unjust, however, to judge them from the moral standpoint of the 19th century; and if the honour of discovery must be denied to Bethencourt, Macham, van den Berge, and others, they nevertheless retain the great merit of having prepared the way for the era of great geographical discovery, through the interest for maritime exploration raised in the ruling class at the courts and senates of Western Europe by their tales of treasure won and adventures brought to a fortunate end.

It appears, then, that at the beginning of the 15th century there was a fairly good knowledge of the groups of islands in the eastern part of the Atlantic between 27° and 40° N.: further that the north-west coast of Africa was known at that time, not only as far as Cape Bojador, but also, as shown by the names on the other side of "Buyetder" on the Atlas Catalan, a good bit south of this point. The south coast of Africa was, it is true, as a rule laid down north of the equator by the learned geographers, and was considered impassable by reason of heat (cf. the inscription on maps of the Macrobius type). But from the most remote antiquity there had remained, alongside of this, descriptions or tales according to which Africa was entirely surrounded by a navigable sea and had actually been circumnavigated.

This has been denied or doubted by several authors eminent in the history of geography. I have therefore collected from ancient literature the most important utterances on the subject.

HERODOTUS in chapters 42 and 43 of the 4th book says: "Libya, as is well known, is surrounded by water, except as much of it as borders on Asia; and this was first proved, so far as we know, by Necho, the king of the Egyptians. For as soon as he had stopped digging the canal leading from the Nile to the Arabian Gulf, he sent away Phoenicians in ships, with orders to sail back by the Pillars of Hercules into the northern sea and in this manner to return to Egypt. The Phoenicians thus set out from the Erythrean Sea and navigated the southern sea; and at the fall of each year they landed and sowed the soil in whatever part of Libya they had sailed to, and there awaited the harvest. And when they had reaped the corn they sailed on. And thus, when two whole

years had passed, they rounded the Pillars of Hercules in the third year and came back to Egypt. And they said, what is not credible to me though it may be to another, that when they sailed round Libya [*i. e.* passed the south point of the country] they had the [meridian] sun on the right. In this country Libya was first recognised. But subsequently the Carway Libya was first recognised. But Sataspes, Theaspis' son, an thaginians said the same. But Sataspes, Theaspis' son, an Achaemenid, did not circumnavigate Libya, though he was sent out for that purpose Sataspes went to Egypt where he took a ship and sailors and then set sail for the Pillars of Hercules. Having sailed out through them and rounded the promontory of Libya which is called Soloeis, he sailed southwards. And for many months he passed over a long stretch of sea, but the greater part always remained to be passed, so he turned back and sailed to Egypt."

STRABO (II: 3) quotes, first from Herodotus, that Africa was circumnavigated by several people in the time of Darius, and secondly a tale "not otherwise confirmed" of a mage who came to Gelon with the statement that he had sailed round Africa. Besides, in Strabo's great geographical work, there is taken from Heraclides of Pontus a detailed account of repeated voyages by Eudoxus of Cyzicus, from the east as well as from the west along the coast of Africa, which seemed to show the possibility of circumnavigating that continent. The philosophical and at times hyper-critical Strabo adds, however, that the story of Eudoxus' voyages reminds one of the lies of Pytheas, Euemerus, and Antiphanes. It is worthy of mention that the feature in the story of Eudoxus' travels and life that was the chief cause of Strabo's scepticism, is the very one that reminds us of the modern geographical explorer's irresistible spirit of inquiry. Such a desire was unintelligible to the Greek geographer, indifferent as he was to the peoples and countries of the barbarians. But the accounts of Eudoxus' adventures and of the voyage round Africa in Necho's time mention such characteristic traits of the nature and inhabitants of the countries visited that they must in the main be correct. According to Cornelius Nepos (PLINY, II: 67), Eudoxus during his escape from the king of Egypt must actually have sailed from the Arabian Sea to Gades, and the same author states that Coelius Antipater (2nd century B. C.) had seen a man who for trading purposes had sailed from Spain to Ethiopia, *i. e.* to that part of the east coast of Africa situated south of Egypt.

From these accounts it is obvious that Africa had already been circumnavigated several times during the pre-Christian era. The tradition of this seems to have been maintained among sailors in the western Mediterranean. Moreover through ships being storm-driven far south along the coast, through journeys over land, or through accounts by captives returning from Africa, it assumed so definite a shape towards the end of the 13th century that in 1291 an expedition was sent from Genoa under Vivaldi to discover a south-east passage to India, while the Atlante mediceo of 1351 (N. fig. 8) represented Africa surrounded by water and with a shape near enough reality to suggest that the drawing was based on actual observations. As further cartographic evidence on this point I may refer to plate XXXIX, which reproduces one of the first planispheres of the 15th century (that which belonged to Stefano Borgia; see above p. 84 foot-note 2), to the elliptical map of the world of 1447 in the National Library at Florence, and to Leardus' map of the world of 1452. On all these representations of the world the south part of Africa is surrounded by sea. Leardus still speaks of "dexterto deshabtado per caldo". But there is no allusion made to this in the planisphere of Borgia, which is probably much older. That

¹ L. ESTANCELIN: *Recherches sur les voyages et découvertes des navigateurs Normands*, Paris 1832; PIERRE MARGRY: *Les navigations Françaises et la révolution maritime du XIV^e au XVI^e siècle d'après des documents inédits*, Paris 1867. The truth of the accounts of these expeditions is denied by Major in his introduction to "The life of Prince Henry", though on rather slender grounds. The African expeditions of the Normans seem to me on the contrary to rest on quite as good evidence as, for instance, Macham's discovery of Madeira.

by Fra Mauro already registers some discoveries by the men of Henry the Navigator.

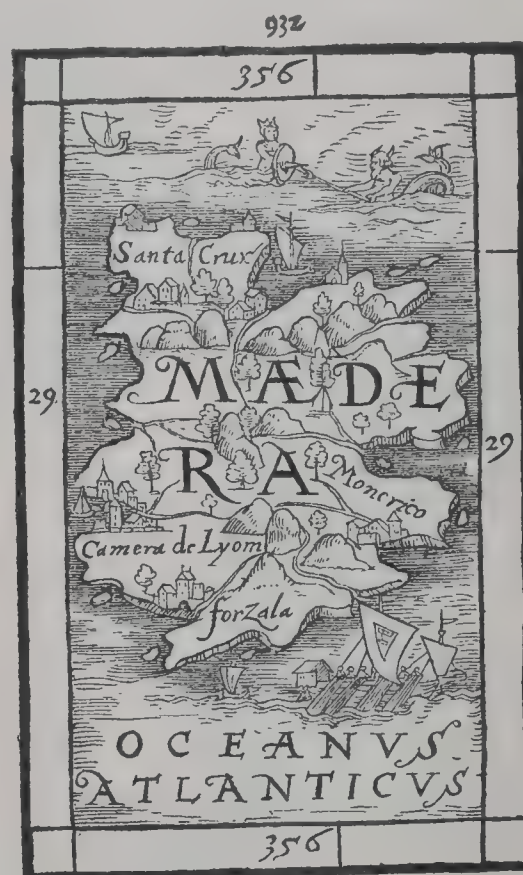
I have thought it right to draw attention once more to these ancient accounts and this cartographic literature, because so many enthusiastic biographers of Prince Henry the Navigator have shown an inclination to exalt his doings at the expense of the knowledge of geographers before his time.

The Infante Dom Henrique, or Henry the Navigator, was born at Oporto in 1394 and died at Sagres in 1460. He was the third son of King John I of Portugal by his wife Philippa, daughter of John of Gaunt, Duke of Lancaster, and granddaughter to that fosterer of English navigation, Edward III. As a youth Prince Henry took a distinguished part in the conquest of Ceuta in 1415. It was probably here that he obtained the information concerning the lands south of the Sahara that led him subsequently to fit out a series of expeditions for exploring the north-west coast of Africa. In these Prince Henry never took part himself. He only incited his courtiers and dependants to similar enterprises, contributed generously to their equipment, and had a princely reward in readiness for the successful. The chief of the expedition was usually one of his courtiers, while the nautical command was entrusted to skilled mariners, often from Majorca or Genoa. For the Portuguese themselves were at first seamen of small experience. According to BARROS (dec. I, book II), they were coasters whom only necessity led to venture out of sight of land. But they soon developed into true sailors, long the most able and daring in the world, thanks to the way in which their ruler fostered the seaman's profession. Charts and nautical instruments were procured and improved. It is even said that a school of navigation was established at Sagres; at least, according to Barros, a Majorcan, Mestre Jacome, a skilled navigator and map-draughtsman, was installed there as teacher. The accounts of Portuguese voyages during the 15th century often make mention of charts, altitudes, and the instruments for their determination, at a time when hardly another instance of this is to be found in literature.

The immediate motive of most of Henry the Navigator's expeditions may, however, have been the gain that accrued from forays and kidnappings along the coast, deeds which our modern notions of right find it hard to excuse, but held by the morals of that time to be praiseworthy achievements, at all events when the people outraged were Moors. Neither were the limits of the coast-districts that had been known from the time of the Carthaginians very appreciably surpassed during the life of Prince Henry. Nevertheless the series of expeditions that he fitted out forms a turning-point in the history not only of navigation and commerce, but in that of the whole world. Thereby the people of Europe were roused from their previous indifference to any extended knowledge of the globe we inhabit, and there was inaugurated the great era, whose discoveries, despite the apathy with which they were regarded by the statesmen and scholars of the time, have had a more powerful influence than any political events since the time of the great migrations on the fate and civilisation of the European race. With full justice, therefore, may MAJOR, in the introduction to his above-mentioned book (p. xxiii), characterise Prince Henry's life-work with the words: "The glory of Prince Henry consists in the conception and persistent prosecution of a great idea, and in what followed therefrom The coasts of Africa visited; the cape of Good Hope rounded; the New World disclosed; the sea-way to India, the Moluccas, and China laid open; the globe circumnavigated and Australia discovered: within one century of continuous and

connected exploration. Such were the stupendous results of a great thought, and of indomitable perseverance in spite of twelve years of costly failure and disheartening ridicule."

The marine expeditions fitted out by Prince Henry, or sanctioned by him in virtue of his monopoly as discoverer obtained from the Pope and from his king,¹ have been the subject of exhaustive works by Azurara, Barros, Ramusio, José Freire, R. H. Major, and others. Most of these voyages, as regards both the preparation for them and the geographical discoveries made by them, were in themselves unimportant, but their total influence on the development of navigation was epoch-making. Here I can enumerate only the most important, though recalling the fact that the majority contributed more or less to the cartographic knowledge of parts of the earth previously known either slightly or not at all. The new discoveries, however, were often kept so secret that the charting of them was either impossible or too late to preserve the rights of the discoverer.



52. Map of Madeira from HONTER's Cosmography, published together with Proclus' De Sphaera and other works, Basileae 1561. (Original size.)

The most important Expeditions equipped by Henry the Navigator.

1416, 1417. After the conquest of Ceuta, Prince Henry gathered, from the inhabitants with whom he there came in contact, information about West Africa, and in the years immediately following he sent out small expeditions by sea to investigate the coast-country. These, however, did not penetrate beyond the stretch of coast which had already been laid down on the portolanos since the beginning of the 14th century (*cf.* maps on pl. V *et seq.*)

1418—1420. A new expedition for the investigation of the north-west coast of Africa was undertaken in 1418 by two of Prince Henry's courtiers, João Gonsalves Zarco and Tristam Vaz. They were stormdriven to Porto Santo, whither a colony was afterwards sent, and thence Madeira was "discovered". For centuries afterwards Zarco and Vaz passed for the discoverers of these islands, till an examination of the por-

¹ Cadamosto, for instance, obtained from Prince Henry the privilege of undertaking his voyages of discovery and plunder along the coast, on the condition either that he himself should fit out the "caravel" and should procure the goods necessary for barter, with the right of retaining three-quarters of all that he brought home, or else that he should furnish the goods for barter to a fully equipped vessel and have the right of keeping half the profits. He was assured that the profit by such a voyage would not be small. (RAMUSIO, I, edition of 1588, folio 97.)

tolanos of the 14th century showed that these islands had not only been discovered before, but had even been called by the names they still bear. "Madeira" is only a translation of the Italian name "legname", which occurs, for example, on the Atlante Mediceo of 1351 and on Soleri's portolanos from the latter half of the 14th century. But as I have often before pointed out, these mariner-maps hardly existed for the world of politicians and scholars. The islands of the Madeira group first impressed themselves on its geographic consciousness in 1418, when they were formally taken possession of by the Portuguese and colonised. Zarco and Vaz received Madeira as a fief, Porto Santo was handed to Bartolomeu Perestrello, whose daughter subsequently married Columbus. The first printed special-map of any of them is, so far as I know, a coarse woodcut of Madeira in HONTER's *Cosmography*, published together with the "De Sphaera" of Proclus and other works, Basileae 1561 (N. fig. 52).

During the years 1431–1445 the Azores were "discovered" and colonised by Prince Henry's men under the command of Gonsalo Velho Cabral, with the direct guidance of a portolano received from Italy and having these islands marked upon it.

In this connection it may be mentioned that so early as 1344 the Canary Islands, partly under the same names as in Ptolemy's maps, were given by Pope Clement VI as a fief to Don Luis de la Cerda, who received the title "Princeps Fortuniae".¹ There was, however, no actual occupation of these islands, some of which were inhabited by a fairly numerous native population, although from this time they were more often than before exposed to adventurers, who, of their own will or driven by storm, landed on their coasts to barter and to plunder. Then came the colonisation under Bethencourt, who in 1402 took possession of the islands in the name of the king of Castile. After this they were recognised as a Spanish possession, though the natives were not completely conquered before the end of the 15th century. Though these islands lay on the highway to India, they seem to have been little touched by the Portuguese voyages of discovery.

1434. The particular aim of Prince Henry's ambition and thirst for knowledge was not, however, the seeking out and colonising of various small islands in the ocean, but the investigation of the coasts of Africa beyond the limit at which civilised nations had stopped for twenty centuries. To sail south from the Canaries past Cape Bojador to the Guinea coast ought not, one would think, to be accompanied by any greater difficulties than is the sail, say, from Sagres to a port on the coasts of Spain or England. Indeed a modern sailor would regard the former stretch of coast as less dangerous than the latter. It must therefore be considered as a remarkable proof of the power of superstition that Prince Henry found it so hard to induce any of his associates, eager though they were for action and for gain, but still with little knowledge or experience of sea affairs, to penetrate along the north-west coast of Africa beyond the cape which they regarded as the boundary of the known world. Thus it was that after the colonisation of Madeira expeditions were sent out year after year in the direction indicated, without result worthy of mention. Since at the same time the returns from kidnapping and plunder diminished, while the expeditions, costly in themselves, often resulted in loss of ships and of human life without affording much knightly honour or material advantage, they became the subject of strong censure. All the greater was the applause when the tenacious per-

severance of Prince Henry was at last crowned with true success, nearly twenty years after the first African expedition had been sent out. For in 1434 one of Prince Henry's men, Gil Eannes, at last succeeded in passing Cape Bojador. The year before he had returned from a similar journey without having been able to get further than the Canary Is., and even on this occasion he seems to have penetrated but a short distance beyond the dreaded promontory. Here he landed on an uninhabited desert coast, from which only a few plants could be brought home as trophies.

1435. In the following year a fresh expedition was fitted out, under Affonso Gonsalves Baldaya and Gil Eannes. This penetrated 50 leagues further than the expedition of the year before, without meeting any natives. Traces of men and camels showed, however, that the country was inhabited.

1436. Baldaya was therefore sent out anew in the following year with orders to go on till he met with natives. On this occasion the expedition soon came 70 leagues further than in the preceding year, to the place which on old maps is denoted by the name *Rio d'Oro*. From here two youths were sent on horseback to explore the interior of the desert country, to try to find, and if possible to capture, some natives. For Prince Henry had expressly commanded that the expedition should attempt to bring home a native, from whom, after he had learned Portuguese, some information might be obtained as to the country. The youths, whose names, Hector Homem and Diego Lopez d'Almeida, are mentioned with pride by the Portuguese chroniclers, after riding for some time actually met with nineteen men, each armed with a cutting weapon (azagay). A fight took place, but they were not successful in making any prisoners. The place was afterwards called Angra dos Cavallos. On a reef in the river mouth there was found a herd of about 5000 seals ("lobos marinhos"), many of which were killed; their skin was thought very valuable. From there Baldaya sailed yet 50 leagues further along the coast (170 from C. Bojador). But no natives could be captured here either. A fishing-net, however, was found and was brought home as proof that the land continued to be inhabited. Proof of this was indeed needed, since on many mediaeval maps of the world this region was denoted by the words "terra inhabitabilis propter calorem". The harbour from which the return voyage started was called Porto da Galé, with reference to a rock on the shore resembling a galley.

In the following years the interest of Portugal and the time of Prince Henry were occupied by attempts to conquer Tangiers and to release the young Prince Dom Fernando, whom the Moors had taken prisoner, by change of monarch, and by other matters. Consequently voyages for the avowed purpose of discovery stopped for some years, during which only small expeditions were sent out for catching marine animals.² These returned home, often well loaded with skins and train-oil, but without having penetrated further than their predecessors, *i. e.* beyond Porto da Galé.

1441. This year a young courtier, by name Antam Gonsalves, was sent out by Prince Henry on a similar hunting expedition. He at first occupied himself with hunting, and when the ship was fully laden with skin and train-oil, he continued his voyage along the coast to make new discoveries and to capture natives who might be offered to the Infante as a present. He finally succeeded in taking two during an excursion into the interior of the coast-country. Just as he was about to return with them, he met a well armed caravel

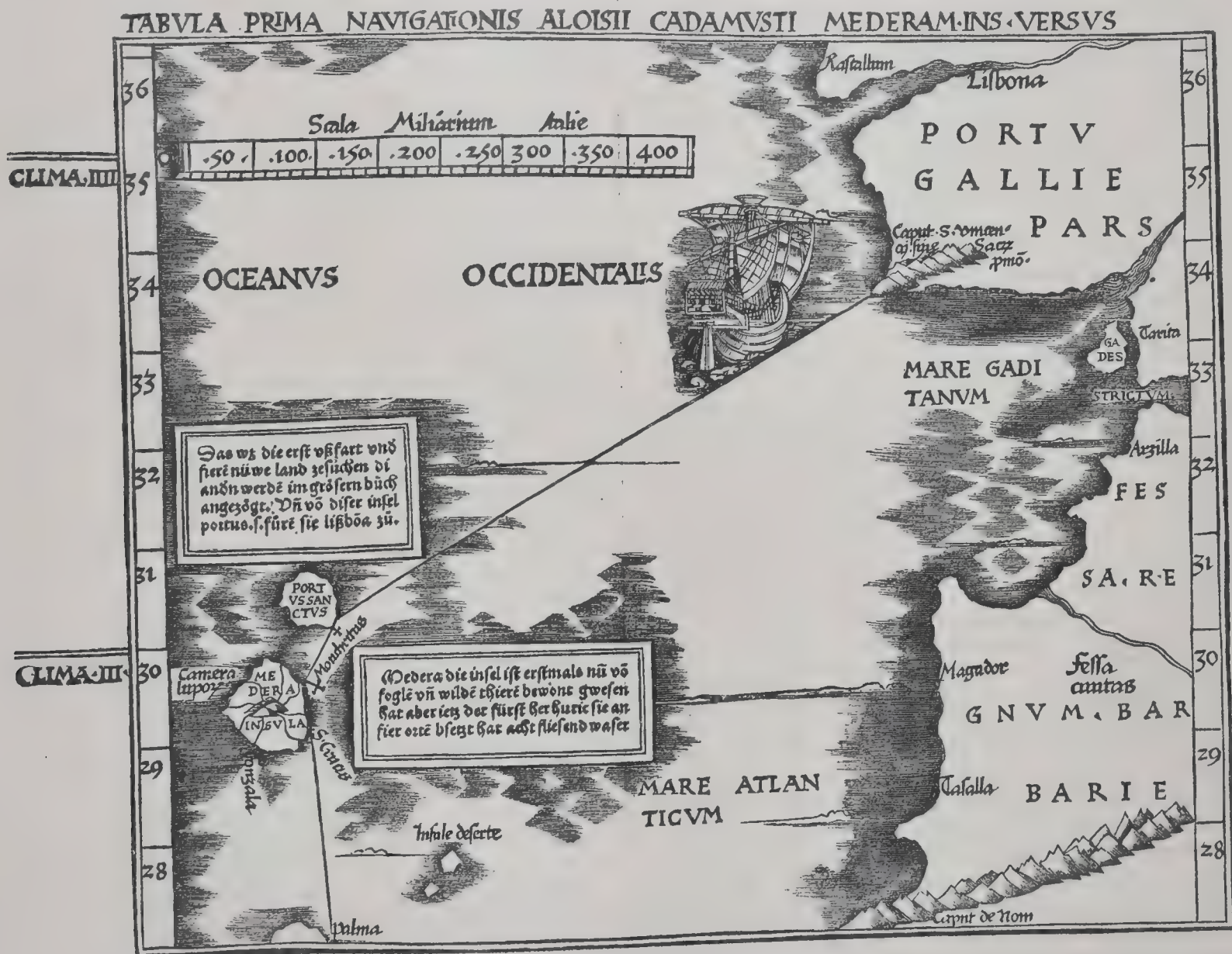
¹ Through Dr. K. H. Karlsson I have obtained from the Vatican archives a copy of this bull (Reg. Vat. 216, fol. 13 verso—15). It is dated "Auinione XVII Kalendas Decembris anno tercio" (15 Nov. 1344), and begins thus: "Dilecto filio nobili viro Ludovico de Ispania, principi Fortunie, salutem" etc.: The feudal islands were: Canaria, Ningaria, Pluviana, Capraria, Junonia, Embronea, Athlantia, Esperidum, Ceruent, Gorgodes and Galeta.

² According to Professor W. Leche, either *Monachus albiventer* or *Manatus senegalensis*. *Monachus albiventer* occurs not only in the Mediterranean but also at Ins. Desertas (south east of Madeira) where it was common at least as late as 1854. *Manatus senegalensis* is said by Brandt to extend from 16° N. to 10° S. Perhaps it formerly reached further north. Probably both these marine animals occurred during the 15th century in enormous herds on the uninhabited islands of the ocean, the seal further north and the manatee nearer the equator.

sent out by the prince, and commanded by Nuño Tristam. The latter had orders to sail as far as possible beyond Porto da Galé, and in every way to endeavour to bring home captives, from whom it was expected that important information about the country further south would be obtained. The two commanders now set out together on an excursion into the interior of the country, during which they made ten natives captive at a place which was afterwards called Porto do Cavalleiro, because Gonsalves was here dubbed a knight by Tristam. Thence Gonsalves returned to Portugal. Tristam went on, after having sailed past Porto da Galé, to a point, which because of the white colour of the rocks on the coast, was called Cabo Branco (Bianco). Thence he too sailed back to Sagres, where he was received by Prince Henry with great honour.

along the west coast of Africa. The captive chief and two captive youths were in the following year taken back to Porto do Cavalleiro, where they were exchanged for a number of male and female slaves, gold-dust, a quantity of ostrich eggs, and other products of the country. This was the beginning of the African slave-trade, which before long was to develop so enormously and to remain for centuries the foulest stain on the white race.

In 1443 Nuño Tristam penetrated beyond Cape Branco to the Bay of Arguin, in which several little islands (Garzas, Gete, Naar, Tider) were discovered. These islands and the roads between them subsequently became a halting-place during the voyages of discovery and later on during the trade-voyages to India. Here in 1480 was erected a fort, which was occupied by the Portuguese for nearly 200 years, sub-



was sent out under the command of Lanzarote, to avenge the death of Gonsalo de Cintra. After having plundered the Isle of Tider and made a number of captives, they sailed to Cape Verde, near which several battles were fought with the negroes. Many Portuguese were killed by their poisoned arrows and assegais. In this way perished Nuño Tristam, together with the greater part of the crew of his caravel, in 1446, when attempting to land in a large estuary (Rio Grande) situated south of Cape Verde.

Up to 1446, according to AZURARA (chapter 78), 51 caravels had been fitted out by Prince Henry for the west coast of Africa. They had penetrated 450 leagues beyond Cape Bojador. It had been founded that the coast extended from there southwards with many promontories, and the Prince had had a drawing of it appended to the charts; 927 natives had been brought from Africa to Portugal as slaves. Foreigners also took part in these expeditions, among them a Dane, "Vallarte". As the commander of one of the prince's caravels he sailed in 1448 past Cape Verde to the stretch of coast inhabited by negroes. At first his relations with the natives were peaceable, but finally Vallarte and some of the crew when going ashore were suddenly attacked and killed or taken captive.

Love of brave deeds and the desire to extend the knowledge of the coasts of Africa was evidently at first the main idea in the equipment of the African expeditions of Prince Henry. But later on the desire for gain through seal-hunting, plundering, and kidnapping became the chief motive. Only in this way can we explain how all these expeditions did so little from a geographical point of view. They resembled modern sealing expeditions in the North Atlantic Ocean, seeking new hunting-grounds, after the game (here defenceless Moors and Negroes besides the seals) has been extirpated or driven away from its old haunts. The account of these pretended heroic deeds thus becomes exceedingly empty and repellent, and the outrages are not to be excused by any of the fine sentiments reproduced by Major from Azurara's chronicle, as to the wish to propagate Christianity, for which little or nothing was done, or as to the mild way in which the natives, carried off from their homes, after having been sold as slaves, were occasionally treated in the foreign country.

It is therefore pleasing to be able to record among the naval expeditions sent out by Prince Henry, even in this later period, an exception, a real voyage of discovery not sullied with outrages towards the natives, and just because of that crowned with unusual success.

A young Venetian nobleman, Alvise Cadamosto, when on a voyage from Venice to Flanders, was delayed by storm at Cape St. Vincent. He there made the acquaintance of Prince Henry, who was staying in the neighbouring village of Reposeira. Conversation with the Prince kindled in Cadamosto a desire to go on an expedition of discovery to Africa. He left the Venetian galley and assumed instead the command of a caravel of 90 tons. His lieutenant was Vicente Dias. They set sail on the 22nd of March 1455, and arrived after only three days at Porto Santo. Thence they sailed to Madeira, the natural conditions of which place are minutely described in Cadamosto's account of his voyage, and further to Cape Branco, which became the starting-point for a peaceful expedition of discovery to the interior of the country for the study of its natural conditions, inhabitants, trade, etc. Then Cadamosto sailed to the Senegal. This river formed the boundaries between the regions inhabited by the Moorish population and the Negroes; and with the latter also Cadamosto held friendly intercourse. Country and people were again minutely described. Thence he sailed further south. Before Cape Verde was passed, he met two ships, the one belonging to a Genoese, Antonio de Nolli (Usodimare), the other to a Portuguese in

the service of Prince Henry, not mentioned by name. Usodimare's vessel is the first non-Portuguese craft spoken of in these waters. The three ships now continued the expedition together past Cape Verde to the mouth of the Gambia, whence, after vain attempts to enter into friendly relations with the natives, they return to Portugal.

In the following year Cadamosto and Usodimare undertook another voyage, which resulted in remarkable success. They sailed straight to Cape Branco, and there left the coast waters and sailed further out in the open sea, discovering in consequence the Cape Verde islands. A rich animal life was found on these islands hitherto unvisited by man, and the birds were so tame that they could be taken with the hands. Subsequently the explorers steered for the Gambia where friendly intercourse with the natives was at last entered into. Thence the voyage was continued still further south to some islands (the Bissagos islands), lying in the mouth of a large river (Rio Grande).

Cadamosto has left a fairly detailed and vivid description of his two voyages of discovery, written with a clear eye for essentials. This has been published in print several times.¹ Probably he also left map-drawings. For I presume that the portolanos by Benincasa quoted below (p. 126) were based on Cadamosto so far as the mapping of the African coast was concerned. The map by LAURENTIUS FRISIUS (1525), here represented in fig. 53, was perhaps of similar origin; for this I must refer to HARRISSE: *Bibl. americana vetustissima*, p. 246 and to the Facsimile-atlas, p. 103. Comparison of Frisius' ugly wood-cut with Benincasa's beautiful map of 1467 (N. T. XL) gives one an idea of the great superiority in map-drawing of the portolan-draughtsmen of the 15th century over numerous learned geographers of the first half of the 16th century.

Cadamosto deserves praise for the way in which he treated the natives, avoiding such chivalrous outrages as seem often to have formed the chief aim of his predecessors' ambition. Besides, the expeditions of Cadamosto made several important purely geographical discoveries, among them that of the Cape Verde Islands.

Various inaccuracies in the account of Cadamosto's second journey have led Major to consider it a forgery. He supposes that the true discoverer of the Cape Verde islands was the Portuguese Diego Gomez, who is said to have been the first to land on the Isle of St. Jago during a voyage in company with Antonio de Nolli in 1460. But in an account of travels, printed long after its author's death, a few contradictory statements, possibly arising through copyist's errors, do not justify such a conclusion. Major himself seems to have understood this, since the rash attack upon Cadamosto does not recur in the 2nd edition of his work on Prince Henry.

Henry the Navigator died on the 13th of November, 1460. All contemporary historians and chroniclers are at one in highly praising his genius and perseverance, generosity and noble ambitions, while his merits as an explorer of unknown countries on our globe have been highly extolled. But if one counts and weighs the really new geographical discoveries that were made under him, or rather at his initiative, they do not come to so very much—to very little if distributed over years and caravels. He himself, as already mentioned, never took part in any voyages other than the military expeditions across the straits to Morocco. And yet it is with ample reason that one of the foremost places in the history of navigation has been assigned to him. The Scandinavians, it is true, five centuries earlier had travelled far out of touch of land across the ocean to Iceland and Greenland, and this over the heavy billows of the stormy polar sea. But it was Henry the Navigator who first, and that not without great difficulty, introduced this art among the coast-population of the Iberian peninsula.

¹ The first time in Vicenza in 1507; subsequently inserted in GRYNÆUS' *Novus orbis regionum ac insularum veteribus incognitarum*, Basileae 1532, in RAMUSIO's *Primo Volume Delle Navigazioni et Viaggi*, Venetia 1550.

Through the naval expeditions to the coasts of Africa, fitted out year by year under Prince Henry's encouragement and enlightened direction, the art of ship-building as well as of navigation gradually attained in Portugal to a height before unknown. Thus were rendered possible the bold voyages of the end of the 15th century and the beginning of the 16th, and thus Prince Henry was truly a pioneer for Bartolomeu Dias and Vasco da Gama as well as for Columbus and Magellan.

Of charts based on Henry the Navigator's expeditions none are extant, probably not even in Portugal; Santarem at least is unable to mention any. But that such charts were used by his men may be inferred from many passages in Azurara's Chronicle; while the extension of the portolanos beyond Cape Bojador, in Benincasa for instance, probably depended altogether on information given by native and foreign skippers from Lagos. On the other hand, with the knowledge we now have of the portolanos of the 14th century, there can no longer be any question of ascribing the invention of these charts to Prince Henry. Neither is it correct to say that he introduced on charts graduation in accordance with geographical coordinates. As for the academy at Sagres, some information as to its constitution from a really critical historian is much to be desired. Probably a small school of navigation, important no doubt for the period in question, received from laudatory biographers the name of academy. That the captains or navigators trained at his school kept a reliable reckoning and took fairly correct altitudes, is proved by the map which certainly was based on their observations, and which is here reproduced on pls. XLIII and XLIV. Further the extension of the normal portolano along the west coast of Africa, as on the portolanos by Benincasa and others of the latter part of the 15th century, was, as is shown by the legends, based on observations made during the marine expeditions of Prince Henry.

To the description of his own journeys Cadamosto adds the account of a voyage undertaken in 1462 by "Capitano Pietro di Sintra, Portuguese". After the death of the prince, the latter was sent out by the king of Portugal, with orders to penetrate as far as possible along the negro-coast for the discovery of new countries. A Portuguese youth, who accompanied Cintra, gave Cadamosto an account of the stretch of coast which the expedition had discovered beyond Rio Grande, of the places where it had anchored, and of the names these had received. This account, without any rhetorical embellishments, is of interest as a specimen of a Portuguese sailing-direction from a sailor of Henry the Navigator's school. Moreover Cintra advanced about 5° further south than his predecessors, and many of the names he gave are still found on modern maps, e. g. Cape Verga, Sierra Leone, Cape Santa Anna, Cape del Monte, Cape Mesurado. The name Cape Sagres was given to a promontory, "the highest they had ever seen", between Cape Verga and Cape Ledo. Cintra also came to a place, where a great and gloriously green forest went right down to the sea. It was called Bosque de Santa Maria, a name which is put down at 5° 30' on, for instance, map No. 105 in part III of (J. N. BELLIN's) *Le petit atlas maritime*, Paris 1764. Near the turning-point they sailed past a small river, which was called Rio dos Fumos, since nothing was seen here but smoke from fires made by the natives. The name and statement are of interest as reminding us of Hanno's account. In the southern-most country to which he advanced, Cintra, according to the express instructions of the king, seized a negro, who, however, after very kind treatment, was sent back to his native country with a subsequent expedition. Cadamosto concludes his story in these words: "And from this place no other ship has come to Europe before my de-

parture from Spain, which occurred on the 1st of February, 1463."

After this year there was a short break in the voyages of discovery towards the south. They began again, however, after 1469, when King Alphonso V leased the West African trade to a burger of Lisbon, Fernam Gomez, for five years for 1000 ducats a year, on the condition that in each of these five years Gomez should explore the west coast of Africa for a length of 300 miglia, or during the 5 years a total of 1500 miglia^{*} counted from Sierra Leone, "*the place where the last explorers, Pietro di Sintra and Soeiro Dacosta, turned*". According to the above-quoted account by Cadamosto, Pedro de Cintra had, however, already in 1463 gone considerably further south and named points of the coast, but this does not seem to have been known at the court in Lisbon. As regards various other details in the agreement between the king and Gomez, necessary for a correct understanding of the Portuguese voyages of discovery, I am obliged to refer to Barros. The voyages arranged by the skilful, clever and energetic merchant Gomez were crowned with unprecedented success. During the five years of the lease, a stretch of coast was explored of larger extent and commercially more productive than all that had been discovered by Prince Henry's men. This depended partly upon more systematic and orderly control, partly upon the development navigation had gradually attained in Portugal. Sailors now ventured of their own free will far out on the ocean, and soon found that they not only reached their journey's end more quickly that way, but also that it was surer and safer than the way along the coast.

As "discoverers" during the first voyage Gomez selected two of the king's courtiers, João de Santarem and Pedro de Escobar. Martin Fernandez and Alvaro Esteves accompanied these as navigating officers. The voyage began in 1470. On the 29th of December, near the equator, there was discovered a large island, which was named St. Thomas after the day of its discovery. The following year, on the 17th of January, was discovered Santo Antão, subsequently called Ilha do Principe, since the revenue from it had been given to a member of the royal house. It was probably also on this voyage that there was discovered, at the furthest end of the Gulf of Guinea, the beautiful island which was at first called Formosa, but afterwards Fernando Po after its discoverer. The same year the line was passed for the first time by European sailors. So little attention was then attached to this, that not even the name of the navigator that commanded the vessel is known. Perhaps it was Lopo Gonsalves, after whom a promontory directly south of the equator is named. The last explorer sent out by Gomez was João Sequeira, who reached Cape Santa Catarina, in 2° S.

Fernam Gomez acquired great wealth for himself as well as, after the expiration of his lease, for the king. This in its turn reacted on the equipment of the new expeditions. Formerly there had been a number of smaller expeditions, which generally contented themselves with forays of little profit or with unimportant advances beyond points or ports already known; but from the time of Gomez the voyages of discovery are remarkable for the facts that a peaceable commerce with the natives was entered upon, and that long stretches of coast were simultaneously explored and mapped.

The exploring expeditions were fitted out on a larger scale than before, but were sent out less often. Or perhaps the smaller expeditions for purely commercial purposes during the intervals were not recorded by the chroniclers. The establishment of permanent colonies in the newly discovered countries was now taken up in earnest. The first step was to protect the commerce already entered upon, by the erection of a fort at San Jorge da Mina, a place of much im-

^{*} I here give the amount of the rent and the length of the coast that was to be explored, from Ulloa's Italian edition of *L'Asia del S. GIOVANNI DI BARROS*, I, Venezia 1562, folio 32 verso. MAJOR, following Portuguese works, speaks of 500 cruzados and 100 leagues.

portance for the gold-dust trade. This was erected in 1482 by peaceable agreement with the natives.

Two years later Diego Cam was sent out, with orders to explore the country south of Santa Catarina. He penetrated to the mouth of a large river, on the south side of which he erected a stone cross (*padrão*), that he had brought with him, as a sign that the country was taken possession of for the King of Portugal. The inhabitants named the river Zaire; now it bears the name of Congo. Immediately south of the river mouth the name Cape Padron is to be read on modern maps.

From this place four natives of their own free will accompanied Cam to Portugal, on the condition that after 15 months he should bring them back to their native country. This promise was redeemed during Cam's second journey in 1485, during which he was accompanied by Martin Behaim. After having touched at the Congo, he first advanced to a point, St. Augustine, situated in $15^{\circ} 50' S.$; thence to Manga das Arenas in $22^{\circ} S.$, mid-way between the Congo and the south point of Africa. It seems, however, as though the latitudes quoted were much too high; at least Arenarum aestuarium on pl. X in LIVIO SANUTO'S *Geographia*, Vinegia 1588, is placed immediately south of $18^{\circ} S.$ At both these places stone crosses were erected. As evidence of the importance attached to this manner of taking possession of the country, it may be mentioned that near Castel Poderoso de San Augustino on Behaim's globe is to be read: "*Hie wurden gesetzt die säulen des Königs von Portugal anno domini 1485 d. 18 jan.*" According to this Cam's second journey seems to have begun in 1484. One cannot, however, fully rely upon Behaim's data, even for the regions he visited himself. Thus, he says of the islands of the Gulf of Guinea, discovered so early as 1470, that they were discovered in 1484. According to the inscription on Behaim's globe they were then uninhabited, but were subsequently colonized with released convicts.

Soon after Diego Cam's return from his second voyage a new expedition was sent out with two ships of 50 tons, under the command of Bartolomeu Dias and João Infante. These were followed by a smaller vessel with provisions, commanded by Pedro Dias, brother of Bartolomeu. Three members of the Dias family had already taken a distinguished part in the voyages of discovery along the coast of Africa: a certain João Dias had been among the first to pass Cape Bojador; Lourenço Dias was commander on one of Lançarote's ships in 1445; Diniz Dias was the first to reach Cape Verde and to give it a name.

Bartolomeu Dias and his companions set sail in August, 1486. After having passed the Congo, they followed the coast southward to a bay called Angra dos Ilheos, where their first *padrão* was erected. Further south another point was reached; here Dias was obliged to beat up against the wind for some days, and this was therefore called Angra das Voltas. According to BARROS it is situated in $29^{\circ} S.$ The name recurs on modern maps precisely in this latitude, immediately south of the mouth of the Orange river. Thence a strong fair wind drove Dias southward under reefed sails for thirteen days out of sight of land. The sea and air here grew colder, and this seems to have caused some fear to the navigators. After the gale had ceased, the course was set eastward in order to reach the coast, which was still supposed to run approximately north and south. But since after some time land was not sighted on this course, it was altered to a northerly one. In this direction a bay was reached, on the shore of which some cow-herds were grazing their cattle. For

this reason the bay received the name Angra dos Vaqueiros. It is a small bay on the other side of the south point of Africa, near Bull point at the mouth of the River Gauritz, and is now called Flesh Bay. Thus unwittingly the south point of Africa had at last been passed. Hence Dias continued still further eastward to a small island, where a stone cross was erected, in consequence of which the island received the name Santa Cruz. Its situation was determined as $33^{\circ} \frac{2}{3} S.$ An island on the south coast of Africa, northwest of Port Elisabeth, still bears this name. It lies in $33^{\circ} 43' S.$ Thus Dias' determination of the latitude is fairly correct in this instance also.

The crews now began to grumble, and implored Dias to turn. On account of this, and in accordance with his instructions, he summoned a council on board. Dias wanted to continue, but the others were unanimous in the opinion that they ought to turn back; for they had during this voyage already made greater discoveries than had been made on any previous one. A compromise was effected, according to which they should sail on along the coast for two or three days, and then turn if no special events happened, such as might give rise to a contrary decision. In the time thus accorded, Dias came to a river, which was called Rio d'Infante after the commander of one of the vessels, situated 25 leagues beyond the Isle of Santa Cruz—according to BARROS in $32^{\circ} \frac{2}{3} S.$ The river is now called the Great Fish River. Its mouth is situated at about the given distance from the Isle of Santa Cruz, but in a latitude of $33^{\circ} 23'.$ On their way back they saw a cape at the south point of Africa, and, on account of the gale they there had met with, they gave to it the name Cabo Tormentoso, a name which the king of Portugal, with correct insight into the importance of the discovery, changed into Cabo de Boa Esperança. Dias returned to Lisbon in December, 1487.

Hereby the first part of the achievement, planned by Prince Henry with such perseverance, was at last accomplished. The south point of Africa had been doubled, and the possibility of reaching India by sea almost proved. The doubling of the south point of Africa did not, it is true, exclude the possibility of the Indian Ocean being an inland sea, surrounded by land on all sides.¹ In spite of all the superstitious obstinacy with which the geographical views of Ptolemy were embraced far on into the 16th century, they never seem to have prevailed among the drawers of charts intended for the needs of seafarers. Already in the Atlante Mediceo of 1351 (N. fig. 8) Africa is drawn with a fairly correct shape, so correct that one might readily suppose it to be based on actual observations. It is, for instance, more correct than the map-drawing of Africa on the map of the world (fig. 50) which occurs in a MS. by BUONDELMONTE of the latter part of the 15th century,² on BEHAIM'S globe, and on the accompanying map by MARTELLUS GERMANUS, also based on Portuguese data of the end of the 15th century (N. fig. 54). These maps transmit to us the conception of the geography of Africa that obtained during the period following the return of Bartolomeu Dias; and on them, as may be seen, there is no land in the way of the new route for the world-trade of which Henry the Navigator dreamt.

And yet nobody seems, even in Lisbon, to have had a thorough appreciation of the importance of the discovery by Bartolomeu Dias. For a whole decade passed before the country whose hardy sailors had detected the new route, and to whose suzerainty the newly discovered countries had been formally assigned by the Pope, made any economic use of its possession by sending out a fleet with orders to sail by the south-east route to India, round the Cape of Good Hope.

¹ In a Scandinavian description of the earth of the end of the 13th century, the hypothesis was propounded that Vineland was a projection from But among geographers this theory never met with any acceptance.

² This MS., which is kept in the Royal Library in Berlin, is a copy of the work which "Christoforus Bondelmont" sent to Cardinal Jordanus in 1420. The MS. belonged to the Venetian senator Antonius Venerius. One of the notes on the fly-leaves is dated *IV nonas oct. 1481.*



54. Map of the world by HENRICUS MARTELLUS GERMANUS. After D. José de Lacerda. (Original size 0.47 X 0.295 m.)

Dom Emanuel was then king of Portugal. He was 28 years old, burning with ambition and with the desire of extending his power by geographical discoveries as had his predecessors. But the council summoned by him for that purpose, in 1496, gave him little support. It was declared that India on account of its distant position would be difficult to conquer and difficult to defend; that its conquest would weaken too greatly the powers of defence in the home-country; and that as soon as the distant country was conquered, fights with rivals would ensue, as had been the case after the discovery of the Antilles, which had made it necessary to divide the world into two sections of about equal size for discovery and conquest, and so forth (BARROS, dec. I, book IV, chapter I). But other counsels more agreeable to the king were also given, and these latter were followed.

Four ships, the largest of 120 tons, the smallest of less than 100, were fitted out with great care under the special superintendence of Bartolomeu Dias. He had to see that they were strong enough to weather the gales at the Cape of Good Hope, which, according to Barros, "began to awaken a legend of terror in the minds of the sailors, as Cape Bojador had formerly done".

After a solemn ceremony of leave-taking, with a speech from the king and obeisance by the commander-in-chief, Vasco da Gama, who swore an oath to defend unto death the silk standard with the cross of the Order of Christ which was delivered to him, the fleet set sail from Lisbon in the beginning of July, 1497.

The names of the ships were: *San Gabriel*, under the command of Vasco da Gama himself; *San Rafael* under Vasco's elder brother Paolo da Gama; *Berrio* under Nicolas Coelho; and a smaller provision-ship under one of Gama's servants. Bartolomeu Dias accompanied them on a separate ship, bound for La Mina. On Gama's ship was a brother of Bartolomeu Dias, together with Pedro de Alemquer, who had been navigating officer on the first voyage round the Cape of Good Hope. The other navigating officers were João de Coimbra and Pedro de Escobar. The brothers Gama and Nicolas Coelho who had the chief command of the ships, were selected not from professional sailors but from the king's courtiers. Vasco da Gama, however, must have been accustomed to the sea.

A good start was made. After having set sail from Lisbon on the 8th of July,¹ in 13 days Vasco arrived at one of the Cape Verde Islands, San Jacopo, where he was separated from Dias, who went straight to La Mina. Vasco continued southwards. He landed for the first time on the coast of the main land at St. Helena Bay, situated between 32° 30' and 30° S. Here they watered, and took the sun's altitude with an astrolabe, a new instrument for measuring the height of the sun above the horizon, probably manufactured by Martin Behaim.² This instrument, however, could not be used without difficulty on small vessels rolling heavily on a rough sea. At this bay Gama soon came to blows with the natives, an occurrence of which his hot and violent temper caused frequent repetition. Some few days after this place had been left, the Cape of Good Hope was passed without difficulty, and on St. Catherine's Day, the 25th of November, was reached the bay which Dias called San Bras. On St. Lucy's Day, the 13th of December, the expedition met with a severe gale, during which mutiny broke out among the crew, who wished to force the commanders of the ships to turn. Vasco da Gama, however, suppressed this with great firmness, declaring that nothing could induce him to turn homewards before he had procured the information concerning the route to India, to obtain which he had been sent out by the king. On Christmas Day a coast

was seen, which for that reason was called the Natal coast, a name which it still bears.

On the 6th of January the expedition landed at the mouth of a river, which was called Rio do Cobre. Coelho's ship was here discarded and burnt; the others were repaired. Naturally they had been ill-treated by the long voyage and the heavy gales. All that was needed for the repairs was found on board, an excellent instance of the care with which the expedition had been fitted out. The navigators and sailors who had been clapped in irons for mutiny, here obtained their liberty on the condition that they should put on their chains again when presented to the king on their return home, with no intention of harming them, but to the greater glory and honour of Vasco da Gama. The country was inhabited by a race previously unknown to the Portuguese, the Kaffirs. Here Gama was well received, wherefore the country was called Terra da Boa Gente. On the 22nd of January they came to a large river, up which they sailed for a considerable distance, following some of the native vessels, which had sails made of palm-leaves. The explorers were rejoiced to find here a richer and more cultured people than had hitherto been met with on the coasts of Africa. It is true that the people even here for the most part resembled negroes, but there were mingled with them less dark people, who were supposed to be a cross between negroes and moors. Some of them even understood Arabic, and were richly dressed. The people called the country Mosambique. Gama named the river Rio dos Boos Signaes, and erected here a padrao, which he called S. Rafael. Among the crew a bad epidemic of scurvy broke out, a disease which subsequently, down to the 19th century, has had so many victims among those engaged in lengthy voyages.

The expedition continued its voyage on the 24th of February, and arrived on the 1st of March at Mosambique, on the 7th of April at Mombasa, and on the 15th at Melinda. Thence Gama started, on the 24th of April, straight for India, under the guidance of an Indian pilot, whose name was Malemo Canaca, and whom Gama had procured from the ruler of Melinda through fraud and violence.

On the 20th of May, 1498, Gama anchored in Calicut, then an important city on the west coast of the Indian peninsula, situated in 11° 15' N. and 75° 45' E. Gama's conduct here was distinguished by a series of outrages, which all the admiration for the geographical achievement with which his name is connected does not make it easy for us to excuse, and which from the very first completely undermined the dominion which the Portuguese founded in India.

Gama stayed in India till the 5th of October, when he sailed westwards from Anchediva. The crossing to Africa, in consequence of contrary winds and calm, took three months, during which a fresh attack of scurvy carried off thirty men. Land was first sighted at Magadoxo, and on the 7th of January Melinda was reached; on the 20th of March the Cape of Good Hope was rounded, and at the end of August or the beginning of September 1499, the expedition again anchored in the harbour of Lisbon.

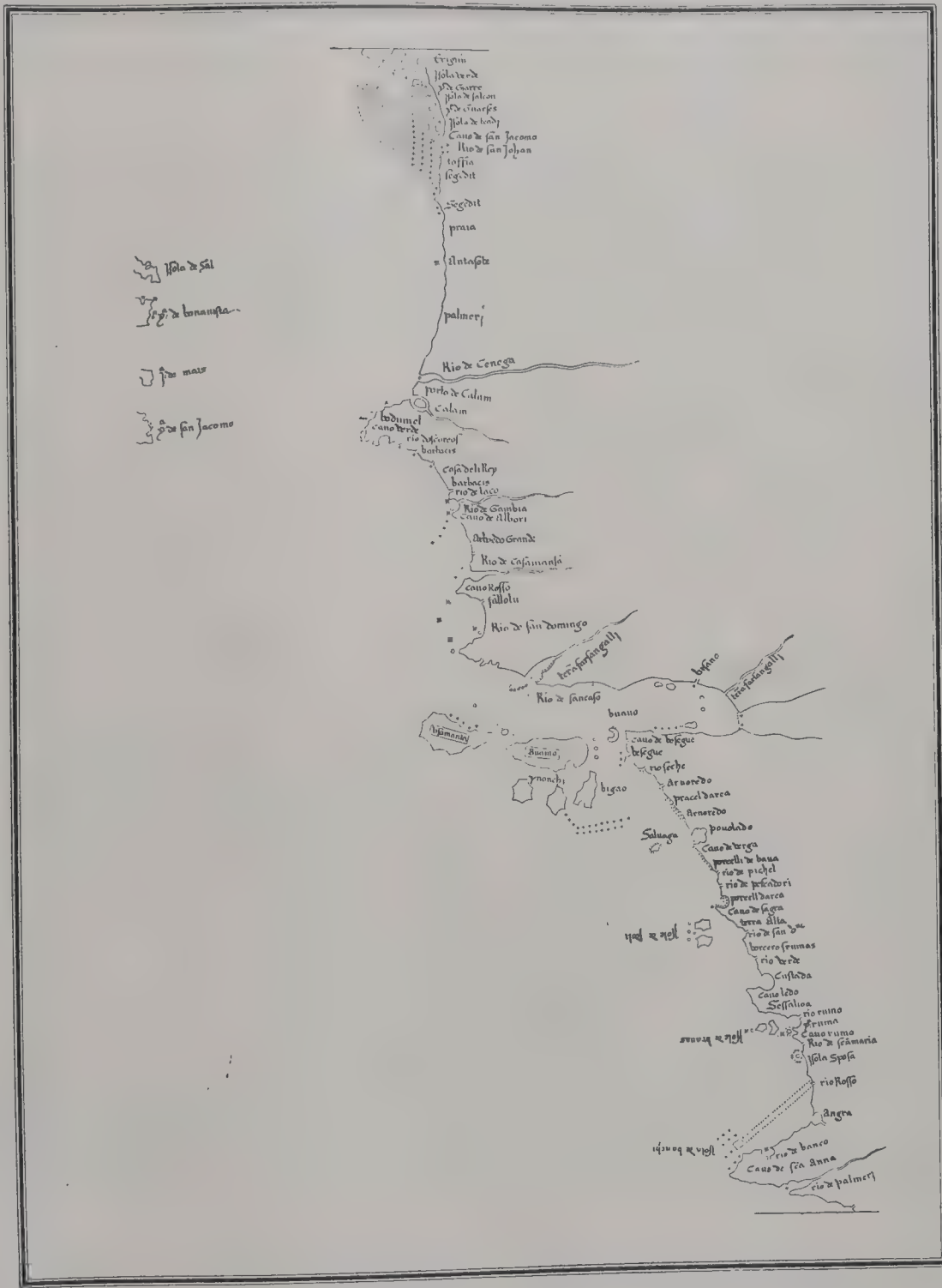
The journey had been long and difficult. A considerable part of the crew had succumbed on the voyage, among them Vasco da Gama's brother Paolo, the only person with whom one can completely sympathize among those met with in the description of this the first voyage to India, stained as it was with so many and such dreadful cruelties. The achievement, however, was unparalleled in its consequences. It forms an absolute turning-point in the commercial, economic, and political history of Africa and Asia, while in the similar history of Europe it is only surpassed by the slightly prior discovery of the New World.

¹ This and the following dates are according to BARROS. They do not quite accord with those of other chroniclers (vide STANLEY: *The three voyages of Vasco da Gama*, London, Hakluyt Soc., 1869).

² According to BARROS (decade I, book IV, chapter II) this was invented by the king's physicians Roderico and Giuseppe Hebreo, in conjunction with Martino Boemo, a pupil of Regiomontanus. Probably the latter should have the chief merit of having invented an instrument of such value for the navigation of his time.

Naturally the cartography of Africa was altogether altered by the voyages here enumerated and by those that followed them during the next decades. By this circumstance several biographers have been induced to believe, that charts were first introduced by Prince Henry, and that he was the first to divide maps into degrees of latitude and longitude. As has been shown above, neither statement is correct. Portolanos or charts drawn long before Henry the Navigator was born are now known. Ptolemy's maps of the 2nd century A. D. are graduated, and so are the maps of the North of the 14th and

who had been a prime-minister of Portugal, in his exhaustive works on the history of cartography, written with such appreciation of the former maritime power of Portugal, was not able to refer with certainty to a single Portuguese chart of the 15th century.¹ Azurara, however, expressly says that the sailors of Portugal began in 1434 to draw charts of the coast beyond Cape Bojador; and that the new discoveries were duly laid down on maps or charts, is confirmed by the fact that all or nearly all the names that occur in the accounts of their explorations, recur on Italian, Catalan, and French maps of



55. Part of the west coast of Africa in G. BENINCASA's atlas, 147L. From Santarem. (Original size 0.44 x 0.32 m.)

the beginning of the 15th century. On the other hand we possess no map originating directly from Prince Henry's celebrated school of navigation. Nor is it very probable that any such map will ever be discovered, since the late Viscount Santarem,

Africa and South Asia during the 15th and 16th centuries. Most of these names have even been preserved to our time.

Excluding Ptolemy's Atlas^a and the mediaeval representations of the Earth³ the most important works for the

¹ SANTAREM: *Recherches sur la priorité* etc., Paris 1842. In the *Liste des cartes décrites ou citées* on pp. cix—cxiv Santarem records, it is true, under the year 1444 "Portulan portugais inédit"; but no further reference to that map occurs in the text, so far as I can find.

^a As regards Ptolemy's conception of the topography of the interior of Africa I must refer to my Facsimile-atlas and to HENRY SCHLICHTER: *Ptolemy's Topography of Eastern Equatorial Africa* (*Proc. Roy. Geogr. Soc.*, 1891). This paper is accompanied by an explanatory map and numerous bibliographic references. Dr. Schlichter has reduced Ptolemy's distances by $\frac{1}{6}$. This is evidently perfectly correct. For Ptolemy's maps, with the exception of some few fixed points determined astronomically, were constructed with the help of itineraries, the distances of which were inscribed on maps divided into degrees of latitude and longitude. He supposed 1° to equal 500 stadia instead of 600. In this way the distances counted in degrees, as is the case on the maps, became one-sixth too large.

³ See JOMARD'S, LELEWEL'S and VIVIEN DE ST. MARTIN'S often quoted works, also *Die Entdeckung Amerika's in ihrer Bedeutung für die Geschichte des Weltbildes* von KONRAD KRETSCHMER, Berlin 1892, as well as the above-quoted work by KONRAD MILLER: 32

cartography of Africa up to the end of the 16th century, are the following:

A) *Portolanos before the beginning of Prince Henry's voyages.* At the beginning of the 14th century the geographical knowledge of the portolan-draughtsmen does not seem to have extended very far west of the Straits of Gibraltar. But already before the middle of the century, we find marked *e. g.* on Dulcert's portolano of 1339, some of the Atlantic islands and the coast of the mainland as far as Cape Bojador. Somewhat later, but still before the beginning of Prince Henry's voyages, the most important of the Azores, the islands of the Madeira group, and the Canary islands not only were marked but were also denoted by names, the same as they still bear. Simultaneously various maps bear inscriptions even beyond Cape Bojador, showing that this point *did not form the farthest limit of the voyages of Catalan and Genoese sailors.* Neither should we omit to note that the shape of Africa in the "Atlante mediceo" of 1351 (N. fig. 8), suggests that it represents actual observations probably communicated by crews of storm-driven ships. But after all, the knowledge of Africa beyond Cape Bojador and south of the entrance to the Red Sea, thus gained, was so incomplete and vague that the claim to be discoverers of these countries must be accorded to Gil Eannes, Diniz Dias, Cadamosto, Bartolomeu Dias, Vasco da Gama and others. For the rest, the newly discovered coasts of Africa were for a long time of small importance in comparison with the new route for the world-commerce and for the conquering expeditions of the white race, which was here opened by the country-men of Prince Henry.

B) *Charts after 1416, i. e. after the beginning of Prince Henry's voyages.*

The first portolano in which the voyages of Prince Henry had any effect on the mapping is, so far as I know, a chart drawn in London by Andrea Bianco, "Comite di Galia"¹ (*cf.* p. 62), in 1448, that is to say shortly after Diniz Dias had rounded Cape Verde. On this chart Bianco makes the west coast of Africa suddenly end with Cape Rosso situated immediately south of Cape Verde; from this point the coast is drawn straight eastward in a style which clearly indicates that the country further south is unknown. The outline of the south coast is here drawn according to the wheel-maps of the Macrobius type. As usual, this map or its unknown Portuguese original was often copied by contemporary portolan-draughtsmen. Thus, on several of the portolanos made by Gratiotus Benincasa, who was a manufacturer of portolanos between the years 1435 and 1482 (see p. 60), the west coast of Africa from Gibraltar to Cape Verde has the same contours and the same names as on the chart of Andrea Bianco. One of these portolanos belonging to Mr. Lesouëf in Paris is here reproduced on pl. XL. It is signed: "Gratiotus Benincasa Anconitanus composuit Rome ano dñi MCCCCLXVII." Probably this is a replica of the map signed in the same way, which is kept in the Bibliothèque nationale and which is quoted above, p. 60, as no. 7 of Benincasa's many portolanos. I was not acquainted with Mr. Lesouëf's map when that list was drawn up, but since then I have had the opportunity of examining it in the house of its possessor.

South of Cape Bojador the following legends are to be found on these maps:

Andrea Bianco 1448.	Benincasa 1467.
capo de buyedor	cauo de buçedor Buçedor tabo
tera de telta alta	terra de talalta
tera de chala alta	
tera bassa	terra bassa
fium fratera	fium de fiadetera
rio doro	
	piage
p:o chaulero	porto caualier
p:o de gotestior	porto de Gutristior
tera basa alba	terra bassa et alta
tera alta	terra alta
pedra de gala	terra de Gallo
cabo brancho	
cabo de chabanel	cauo de Cabanel
spiaza basa	piagia bassa
y:a uerde	isola verde
y:a de grain	ysola de Giarre
y:a de falcon	isola de falcom
y:a de garles	y:a de Guarses
y:a de tridi	isola teadi
cabo de S:o iacobo	cauo de san Jacomo
cabo de S:a ana	cauo de scā Anna
cabo de rea	cauo de rea
cabo de madorna	cauo de madeorna
... aialba areal	terra jalla de Acal
aqua	Aqua
cabo de fereno	cauo ferreno
cabo de granborxa deo	A de gratia
cabo de mamcas	
tera de palmera	
tera derrea	terra de Rena
cabo dalbori	cauo albori
cabo uerde	cauo verde
cabo roso	cauo rosso

A careful scrutiny of Benincasa's map of 1467 suggests that the inscriptions were partly produced by mechanical means through printing or stamping, a method of production which naturally was ready to the hand of so prolific a portolan-manufacturer as Benincasa. While of the charts that were printed in large editions during the first half of the 17th century only a few copies remain, nearly 30 of Benincasa's portolanos of the 15th century have been saved from destruction. As regards number, then, his works seem to have corresponded to a large printing-edition.

UZIELLI-AMAT have also remarked in their oft-quoted work that legends on maps by Gratiotus Benincasa's son Andreas are produced by means of printing (*cf.* pp. 63 and 72). Should a closer scrutiny prove the same artifice to have been used on the oldest maps by Gratiotus Benincasa (those of 1435—1445), then this would form one of the earliest examples of the reproduction of writing by mechanical means. Cartographic literature from the beginning of the 14th century ought to be carefully examined in this respect. Mechanical means were probably used for the reproduction of the land-outlines on the charts that pass under the names of Sanudo and Vesconte, and it is possible that they were used for the legends as well.

As may be seen, the correspondence between the names on Bianco's map of 1448 and those on Benincasa's of 1467 is so complete that the two evidently form copies of copies of the same Portuguese original. Benincasa's atlas of 1471, on the contrary, is widely divergent as regards the legends, especially south of Cape S. Jacomo, and extends besides much

¹ On Andrea Bianco's portolan-atlas of 1436, the charting of the coast of Africa ends with Cape Non, that is to say, much farther north than on various portolanos of the 14th century. As the first map on which reference is made to the voyages of the Portuguese, Santarem quotes and copies a portolano by Gabriel de Valsequa, Majorca 1439. Here the north-west coast of Africa is mapped, with numerous legends, as far as C. de Bujeteder (Bojador). Immediately beyond this point, Tarafall and Bujeteder are to be read. Further south the coast-contours are suggested for a distance about as great as that from Ceuta to Bojador, but only with the legends Plagens Arenosas, and at the extreme south, Tisilgame. To judge from Santarem's reproduction, however, this map does not seem to have been at all influenced by the explorations of the Portuguese. Andrea Bianco's map, drawn in London, was not known to Santarem.

further south. It reproduces the discoveries along the coast down to Pedro de Cintra's voyage of 1462 or 1463, and seems in part to be based on direct information from Cadamosto. This can easily be seen by comparing the names of the lower part of this map (N. fig. 55) with the following names occurring in Cadamosto's account of Cintra's voyage: Rio di Besegue, Capo di Verga, Capo di Sagres (with two small islands lying off it, quoted by Ramusio), Rio di San Vincenzo, Rio Verde, Capo Liedo, Isole le Saluezze,¹ Fiume rosso, Capo rosso, Isola rossa, Rio di Santa Maria della naue, Isola di scanni, Capo di Santa Anna, Fiume delle palme, Rio de fiumi, Capo di monte, Capo Cortese, Bosco di Santa Maria.

Southwards this map only extends to Rio de Palmeri. Within that district all the above-quoted names, with the

of the Portuguese down to Bartolomeu Dias and partly for the determination of the date when the Benincasa family began to use type-printing, stamping of names, or other mechanical methods of reproduction in their map-factory.

Next in time after Andrea Bianco's map, and perhaps older than Benincasa's first map comprising the coast of Africa south of Cape Bojador, is Fra Mauro's planisphere of 1459. On this, Cape Verde and Cape Rosso are marked. Near the south-west coast of Africa is a lengthy inscription about Portuguese voyages. Fra Mauro says, that the Portuguese here gave new names to rivers, bays, points, and harbours, also that they made new charts, of which he himself had had many in his possession. At the south point of Africa is the name Diab with rather a long legend. An Indian junk

Africa Libya Adorland mit allen künigreichen so zu vnsern zeiten darin gefunden werden.



56. Map of Africa from SEBASTIAN MÜNSTER'S cosmography. (Original size 0.345 x 0.255 m.)

exception of Saluezze, occur, though in another dialect. A greater abundance of names shows that Benincasa in 1471 had access to other sources than Cadamosto's account, such as it is reproduced by Ramusio.

I here reproduce this map after Santarem. There are besides, as is shown by the list given on p. 60, various still later portolan-atlases by Gratiotus Benincasa, the last dated 1482; also three works by his son Andreas, dated 1476, 1490 and 1508. The map of 1476 is reproduced by LELEWEL; of the other two I have seen neither originals nor reproductions. A careful examination of these maps and a comparison of them with the older works of Benincasa is, however, much to be desired, partly for the cartographic study of the voyages

¹ Called "Isole de branas" on the map.

(zoncho) is said to have been stormdriven to this point in about 1420, and without reaching land to have sailed further westward for 40 days. On the east coast of Africa are, among others, the names Zanzibar (Chancibar) and Soffala. Fra Mauro himself had spoken to a trustworthy person who said that he had *per rabiā de fortuna de traversa* with a ship from India sailed past Soffala to Garbin (placed in the middle of the west coast of Africa). "Adoncha senza alcuna dubitation se puo affermar che questa parte austral e de Garbin sia navigabile e que quel mar indiano sia Oceano et non Stagnon." This remarkable inscription is rendered in full by ZURLA (*Il Mappamondo di Fra Mauro*, Venezia 1806, p. 62). Cf. also HUMBOLDT'S *Krit. Untersuchungen*,

tion of the geography of Africa and the south of Asia obtained after Vasco da Gama's first voyage, as well as for its abundance of original legends along the coast of Africa. Here a real Portuguese work has been preserved to us, the first, so far as I know, that has been brought to light from the hiding-places of the archives. The very way in which the map is graduated shows that we have before us an original work, with its irregularities still unpolished by later revision. For instance, the equatorial lines on the east and west halves of the map do not correspond, and this probably was due to the circumstance that the observations of the navigators when meeting at Melinda, from the Europaeo-African part of the map-district on the one side and from the Africo-Asiatic part on the other, did not harmonise, and there was no time to adjust them for the present map. This affords another example of the double graduation of latitudes mentioned on page 54, as well as a suggestion how this double graduation may have arisen.

MEDINA in *l'Arte del navegar* (fol. XLVIII, edit. Venetia 1554) complains of this double graduation and says that he has denounced this anomaly before the Indian council, with the consequence that such double-graduated maps have been prohibited.

4. During the time immediately after the above-quoted portolano, among maps that include the *whole* of Africa should be quoted the map of the world of which the western part is reproduced in KUNSTMANN'S atlas, under No. III. Map II in the same atlas also belongs here. I shall return to these works, when discussing the cartography of the New World.

5. Next after them in time comes the celebrated map of the world by RUYSCH of 1508, for which reference should be made to the Facsimile-atlas, pl. XXXII and p. 63 and other passages in the text. When criticising the shape of Africa on this map, one should note that the projection used by Ruysch, though mathematically correct, is an unusual one for a map of the world, and has a specially distorting effect on the countries south of the equator. If Ruysch's map were to be redrawn on a less distorting projection, the inaccuracy or deviation from reality, as regards the shape of South Africa, would not appear very great. In such a comparison, however, we must make allowance for the considerable breadth given to the northern part of Africa till late in the 17th century, in consequence of an erroneous graduation of the chart of the Mediterranean.

6. Map inserted in *Itinerarium Portugallensium e Lusitania in Indiam et inde in occidentem et demum ad aquilonem*, Mediolani 1508. Reproduced in the Facsimile-atlas, fig. 37. It is the first map published in print of the whole of Africa as a continent. From that point of view it has some interest, in spite of its exceedingly rudimentary nature and technical imperfection. Further details concerning the somewhat notable work for which the map was prepared, and references to its literature, are given in the Facsimile-atlas, p. 67.

7. Map of the world by BERNARDUS SYLVANUS in PTOLEMY, Venetiis 1511, reproduced on pl. XXXIII of the Facsimile-atlas. The map is incomparably inferior to that by Ruysch and may perhaps be regarded as a learned but altogether unsuccessful attempt to "ptolemise" Ruysch's work.

8. Two maps of Africa in PTOLEMY, Argentinae 1513. These are reproduced on the full size in SANTAREM'S atlas, and on a considerably reduced scale in the Facsimile-atlas, figg. 8 and 9. They are powerfully executed wood-cuts, which, as is shown by the title-page and the numerous le-

gends, are based on direct information from the land of African explorers, Portugal. Along the African coast of the Atlantic and Indian Oceans are about 300 names, which were used in the accounts of Azurara, Cadamosto, Barros and others.

The second part of PTOLEMY, Argentinae 1513, which begins with the special title *In Claudii Ptolemei Supplementum modernior lustratio terrae marisque singula positionibus certissimis regulatius tradens ad saeculi nostri peragrationes*, introduces special maps of the newly discovered countries into atlas-literature, i. e. at first in most editions of PTOLEMY'S Geography during the 16th century, in HONTER'S and MÜNSTER'S Cosmographies, in ORTELIUS' and MERCATOR'S large atlases, etc. It is here strange to compare the above-mentioned "Duae particulae tabulae Africae ex chartis Portugalensium sumptae," occurring in the Ptolemy of 1513, with the revisions of them that were printed north of the Alps during a large part of the 16th century. They gradually degenerated from the Portuguese original into the wretched map which is here reproduced in fig. 56. It is taken from the Cosmography of the learned hebraist, geographer, and mathematician, SEBASTIAN MÜNSTER, a work of which a number of editions were published in different languages during the latter part of the 16th century, the first in German at Basel in 1544. This work, rich in comprehensive independent observations, though illustrated with intense naiveté, long formed the geographical text-book most used by the learned and scholastic world. Its numerous maps show that it was through Mercator and Ortelius that the art of map-drawing north of the Alps first reached the same level of technique that it had attained in Italy after the Ptolemy-edition of 1478.

9. Among Italian maps of Africa, next in time after Ruysch and Sylvanus come some maps of the coasts of Africa beautifully engraved on copper by GASTALDI, and inserted in the Ptolemy of GIOVANNI BATTISTA PEDREZANO, Venezia 1548. The work contains 60 maps, of which 34 are new and non-ptolemaic. Among these Africa is dealt with in one "Universale nuovo", one "Carta marina universale" and five special maps. The maps of this edition served as pattern for the maps in several editions of Ptolemy published during the latter part of the 16th century, mostly in Italy; in these an attempt was made to modernize the work of the Alexandrian geographer by adding a number of new maps of the former *οὐνομένη* as well as of the newly discovered countries. For these Ptolemy-editions and the maps of Africa occurring in them I must refer to the Facsimile-atlas.

In this connection it should be remembered that among the beautiful maps engraved on copper, which during the latter half of the 16th century were printed in Italy in great numbers as loose sheets, and some of which were bound up with a special title-page to form LAFRERI'S atlas (see Facsimile-atlas, p. 118),¹ there also occur maps of Africa. These map-sheets having become rather rare, I shall here note some that I have examined.

1562. (0.596 × 0.437 m.) Dedicated to "Eccmo Philosopho, Mathematico . . . Guardiano grande della scola de S. Marco il Signor Thomaso Rauenna". Signed: PAULO FORLANI VERONESE.² Venetia MDLXII.

1564. 3 maps: *Africa* (0.390 × 0.278 m.), *Arabia*, *India*. "Nelle presenti tre Tavole sono descritte le Marine, secondo le carte da nauicar, et fra Terra secondo i migliori

¹ Information about Lafreri as map-engraver is given by FIORINI: *Gerardo Mercatore e le sue carte geografiche* (Boll. Soc. geogr. Ital., 1890) and by G. CERADINI: *A proposito dei due globi Mercatoriani . . . Pubblicazione interrotta per la morte dell'autore*, Milano 1894, p. 63 and other places.

² There are a number of works extant by Paulo Forlani Veronese. Occasionally he describes himself in his signature expressly as the engraver, e. g., on a map of Natolia, drawn by Gastaldi, engraved by Forlani, and published by Donato Berteli in 1564, and on Gastaldi's map of the Danubian countries of 1566. All the works by Forlani that I have seen are dated between 1561 and 1570, two thirds of them between 1566 and 1568. Gastaldi is probably the author of the map of 1562 here in question.

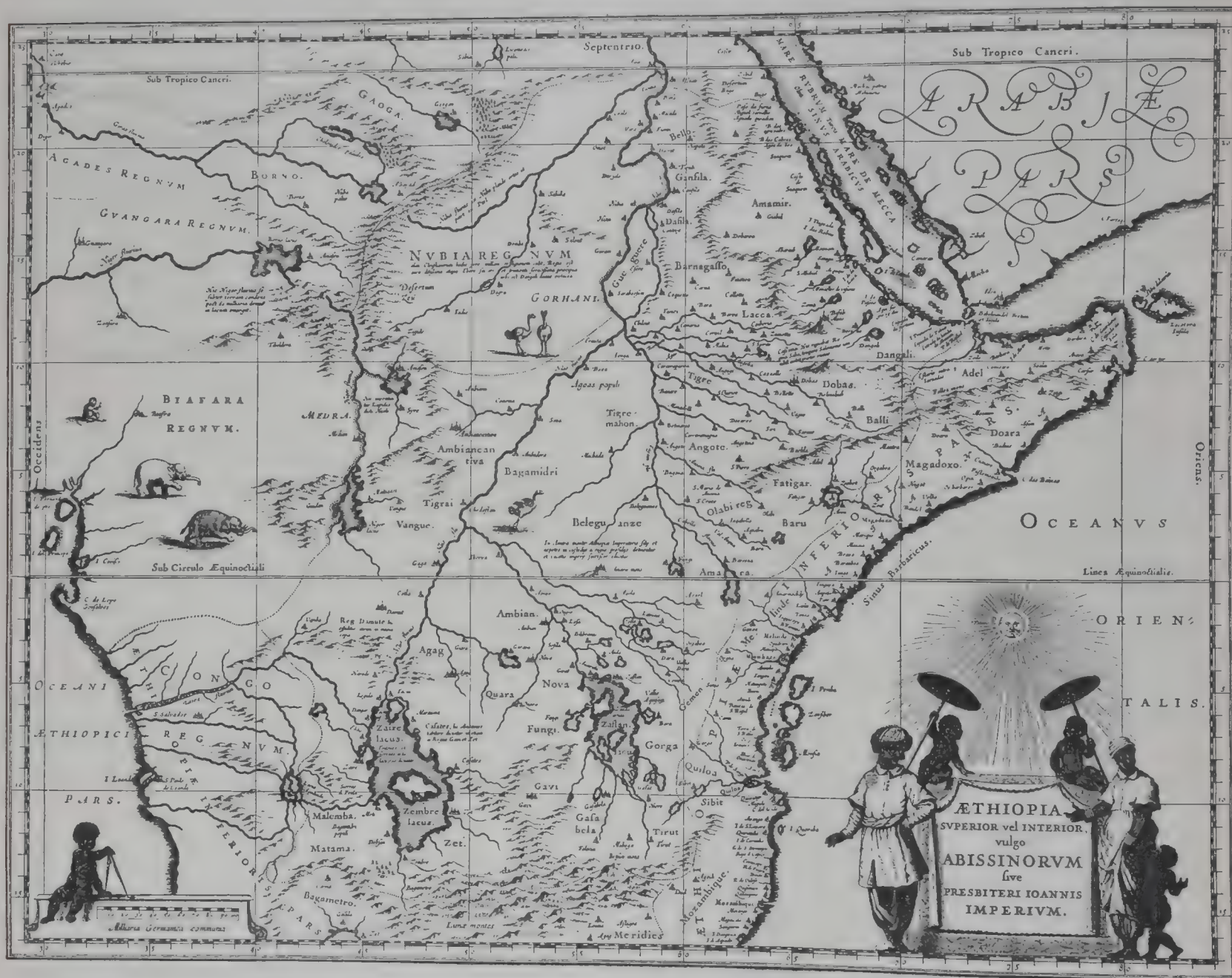
scrittori antichi et moderni. NICOLÒ NELLI f. 1564." At the bottom to the left: "FERANDO BERTELI exc. 1565." On some copies this inscription is missing. North downwards.

1564. 8 maps, together forming a rectangle of 1.423 (E.—W.) × 1.06 m. (N.—S.). The separate maps circa 0.53 × 0.33 m. This large wall-map is signed: "Composta per l'eccellente m. GIACOMO DI CASTALDI piemontese in uenetia . . . FABIVS LICINIUS ex . . . 1564." The map is of great importance for the geographical history of Africa during the 16th century, but may be rare, wherefore a reproduction of it on a greatly reduced scale from a copy in my collection is given on pl. XLVI.

1566. (0.630 × 0.426 m.). "Ad candidum et cordatum lectorem NICOLAUS STUPIUS Africa a Veteribus, antequam

DOMINICO ZENONI, as well as at the very bottom, ORATIO BERTELI. Occasionally the same map appears without a dedication and lacking various other details occurring in the complete work.

There are also from the 16th century a number of portolanos (by Battista Agnese, Johannes Martines, Georgio Calanodos and others), which besides the New World also comprise the newly discovered parts of Africa. I shall defer the description of them to a following chapter, which will deal with the oldest cartography of the New World. There are further various globes of more or less importance for the geography of Africa; for these I must refer to the Facsimile-atlas, HARRISSE's *Cartographia Americana Vetustissima*, also to the above quoted work by CERADINI, RAEMDONCK's ar-



57. Central Africa. From BLAEU's *Novus Atlas*, II, Amsterdam 1635. (Original size 0.495 × 0.383 m.)

pars illa, quam hodie mundum novum appellamus, ab Hispanis detecta fuit, tertia pars orbis habebatur . . . Venetiis MDLXVI. Apud eundem Camotium ad signum Pyramidis. PAULO FORLANO VERONEN. incidente."

1570. (0.198 × 0.174 m.). On the title-shield is a long dedication to Magico S. Francesco Scardino, signed Padova

ticles on Mercators globes, and FIORINI: *Le sfere cosmografiche* etc. (*Boll. Soc. geogr. Ital.* 1893—94).

Through these works the map of the African continent received a shape which it maintained during the whole of the 16th and part of the 17th century. It was, however, very defective, as is shown by the following table.

Geographical coordinates for some points on old maps of Africa.¹

	L a t i t u d e.									L o n g i t u d e, that of Cape Verde = 0.							
	Cape Spartel.	The city of Suez.	Bab-el-Mandeb.	Cape Guardafui.	Melinda.	The Cape of Good Hope.	Cape Negro.	St. Thomas.	Cape Verde.	Cape Spartel.	The city of Suez.	Bab-el-Mandeb.	Cape Guardafui.	Melinda.	The Cape of Good Hope.	Cape Negro.	St. Thomas.
Ruysch 1508 .	36° 30'	29° 30'	12° 30'	10° 20'	3° 30's.	34° 40's.	20° 20's.	1°	13° 40'	13°	65°	72° 30'	83°	68°	49° 20'	39°	31°
Gastaldi 1564 .	36° 40'	28° 35'	12° 45'	11° 40'	0° 40's.	36° 10's.	16° 40's.	0°	14° 38'	9° 30'	56° 10'	69° 55'	82°	69° 10'	43° 50'	37°	31° 30'
Mercator 1569.	35° 30'	29° 45'	11° 15'	10° 20'	2° 30's.	35° 20's.	18° 30's.	0°	13° 30'	11° 30'	61° 30'	71° 15'	77° 10'	64° 30'	42° 50'	34° 45'	27° 30'
Dudley 1647 °.	35° 23'	29° 45'	13° 0'	10° 15'	2° 45's.	34° 30's.	16° 40's.	0°	14° 20'	12°	57° 10'	67° 55'	75° 34'	58° 45'	36°	31°	25° 55'
Scherer 1703 3	35° 15'	29° 51'	11° 30'	12° 30'	2° 0' s.	34° 30's.	15° 30's.	0° 10'	14° 20'	13° 30'	60° 5'	70° 35'	75° 50'	62° 45'	38° 10'	30° 20'	26° 20'
Modern maps .	35° 48'	29° 58'	12° 30'	11° 50'	3° 12' s.	34° 22' s.	15° 40' s.	0° 14'	14° 43'	11° 39'	50° 8'	60° 54'	68° 50'	57° 45'	36° 3'	29° 32'	24° 7'



58. South Africa. From BLAEU's *Novus Atlas*, II, Amsterdam 1635. (Original size 0.495 x 0.398 m.)

This table shows that so early as the beginning of the 16th century there was a fairly correct idea of the extension of Africa north and south. The distance in latitude between Cape Spartel and the Cape of Good Hope is determined by Ruysch (1508) as 71° 10', by Gastaldi (1564) as 72° 50', by Mercator (1569) as 70° 50'. It should be 70° 10'. The breadth of the continent east and west of course depends on the length of the base, *i. e.*, on the distance from Cape Spartel

to Suez; this distance was well known in stadia from the time of Scylax, in portolan-miles or leagues from the time of the portolanos, but in consequence of an incorrect estimate of the size of the globe it received an incorrect value in degrees of longitude, and thus also in relation to the extension of the continent north and south. The difference in longitude for the places in question is 38° 29', but is determined by Ruysch as 52°, by Gastaldi as 46° 40', by Mer-

¹ The geographical coordinates taken from these maps are of course very uncertain. On Hamy's portolano and on the above-mentioned maps of Africa in Ptolemy of 1513, there are no degrees of longitude; for that reason they could not be inserted in the table.

² *Arcano del Mare*.

³ HENRICUS SCHERER: *Tabellae Geographicae*, Monachii 1703.

cator as 50° , in Arcano del Mare (1647) as $44^{\circ} 50'$, by Scherer (1703) as $46^{\circ} 25'$. This breadth was retained by Africa on the maps by LIVIO SANUTO¹ and on maps published under the names of Ortelius and Mercator late in the 17th century.

It is to be noticed that this error was introduced with the graduation of the normal-portolano, which otherwise is on the whole almost quite correct, and that it was transmitted from this map to the maps of the newly discovered countries.

Still during a large part of the 19th century, more than two thousand years after Herodotus, geographers in vain tried to obtain some knowledge of the sources of the Nile. The information about the geography of the interior of Africa was so indefinite and incomplete that cartographers generally preferred to leave the interior of the great continent with hardly any indications of its nature, instead of trying to record cartographically the very uncertain and contradictory statements before them. As is well known, this gap in the knowledge of our globe was first filled during the last decades. Many a geographer, however, comparing the latest maps with maps of the 16th century, has found to his astonishment that several of the great African discoveries of the 19th century were known, though more or less dimly, three hundred years ago. These older notices have been referred to the statements concerning the interior of Africa made in a work on the Congo accompanied by maps by FELIPE PIGAFETTA, Roma, [1591]; this again was said to have been founded on information by Duarte Lopez, a Portuguese, who had lived for many years in Equatorial Africa, and had been sent from there as ambassador to Pope Sixtus VI and King Philip II.

But already far earlier, at least from 1562, there had appeared maps of the interior of Africa, with a system of lakes considerably deviating from Ptolemy and evidently based on actual observation during journeys in the interior or on accounts carefully collected from natives. Forlani's map of 1562 here seems to form the turning-point. On Gastaldi's Tabulae modernae of Africa in Ptolemy 1548 and on the copies of them inserted in Ruscelli's edition of Ptolemy 1561, the map-drawing in the interior of the continent is still chiefly based on Ptolemy. But on the just-mentioned map engraved by Forlani, as well as on Gastaldi's large map of 1564 (N. T. XLVI), the river Congo is marked with a number of affluents. It springs from a large central lake, which also supplies water to a branch of the Nile, and to a third large river flowing straight southwards and disemboguing on the south-west coast of Africa between 25° and 26° S. During the beginning of the 17th century further information seems to have been obtained about the interior of Africa. For on the map of Africa in WILLEM and JOHANNES BLAEU's *Novus Atlas*, Amsterdam 1635 (N. figg. 57 and 58), the Congo, during its course from the central lake to the sea, is drawn with a considerable bend to the north, and there is no longer any large river marked as flowing from the central lake into the Indian Ocean, whereas the communication with the Nile is retained. It was this drawing that subsequently became the standard for all African maps, until during the seventeenth century all these details were erased as being too uncertain and hypothetical, to be adopted again on the maps of our time in a perfected and exact shape, on account of new discoveries in the Dark Continent.

XIII.

Mapping of the south and east coasts of Asia.

Herodotus, who was born in Halicarnassus, was fairly well acquainted with the parts of Asia situated nearest to Europe and Africa. The continent was then bounded by the Tanais, or, according to the opinion of others, by the Colchian Phasis (HERODOTUS, IV: 45), and the Nile,² not by the Ural and the Red Sea. He knew (I: 202), that the Caspian Sea was a separate body of water, which did not join the seas navigated by the Phoenicians and Greeks, viz. the Mediterranean, the Atlantic Ocean, and the Erythrean Sea, which he supposed to be connected. The length of the Caspian Sea, according to him, corresponded to 15 days' voyage, and its breadth to eight days', in vessels with oars. It was said to

be bordered on the west by the Caucasus, "the widest and highest of all mountain-ranges", on the east by an immense plain, watered by the river Araxes, which ends in forty mouth-branches, which all disappear in the sands of the desert or in swamps, except one which flows into the Caspian Sea. Herodotus was also acquainted with the Euphrates and Tigris, and describes the boats made of skin stretched over a wooden frame used for navigation on these rivers.³ They were round like a shield and could take a load of five thousand talents, corresponding, if one may assume that this means Babylonian talents, to a tonnage of 180 tons.

¹ LIVIO SANUTO: *Geografia . . . dell'Africa con XII tavole di essa Africa in disegno di rame*. In Vinegia 1588. One of the maps excellently engraved on copper is reproduced in the Facsimile-atlas, fig. 50.

² Such was still the case during Roman times. "Insularum ante Asiam prima est in Canopico ostio Nili, a Canopo Menelai gubernatore, ut ferunt, dicta. Altera juncta ponte Alexandriae colonia Caesaris dictatoris Pharos, quondam diei navigatione distans ab Aegypto, nunc e turri nocturnis ignibus cursum navium regens" (PLINY, V: 31). MARCIAN (Periplus of the outer sea, 4) takes the Canopic mouth of the Nile as the boundary between the continents. Thus even the islands of the Nile-delta were in the 5th century A. D. still assigned to Asia. On the other hand it is said in the 7th chapter of PII II, *Pontificis Maximi, Historia rerum ubique gestarum*, Parrhisii 1509: "Nili amnem plerique limitem esse inter Asiam et Aphricam volunt. Melior per maria aries between Asia and Africa now accepted, was born in 1405, elected pope in 1458, and died in 1464.

³ Similar boats are still in use there. The first boats used by the Greeks in the Mediterranean may have been of the same kind, i. e., round and bowl-shaped. At least HERODOTUS (I: 163) says that the Phocians were the first Hellenes to use long-boats, and the first to give information of the Adriatic Sea. The ancient Nile-boats, according to the description of Herodotus (II: 96), seem to have been a kind of barge, built of planks. The vessels that were built in Ormuz for navigation to India in the time of Marco Polo were, according to the latter's description, very bad and dangerous, since the planks were not joined by iron nails but bound together with coco fibre. They had probably remained unaltered since the time of the Darius dynasty. A third primeval but far more perfect type of vessel was probably the Chinese junk, the construction of which is minutely described by Marco Polo, and of which he, among other things, says that it was divided into water-proof compartments.

Herodotus' knowledge of the countries and seas of Asia further east and south, on the contrary, was to a great extent founded on tales which had passed through many mouths before they were put down. In the 44th chapter of Melpomene (Book IV) he says that Darius had had the greater part of Asia explored and that Scylax of Caryanda travelled down the Indus and from its mouth westward to Libya (*vide supra*, p. 5, foot-note). In so doing he had found "Asia with the exception of the eastern countries" of the same nature as Libya. By these words Herodotus evidently means that Asia as well as Libya was surrounded by the Ocean. Otherwise he seems to have supposed that the Indus during the whole of its course flowed eastwards. He did not know that India formed a large peninsula projecting between the Indus and the Ganges. Eastwards, according to Herodotus (III: 106,

world, *i. e.* the part which was known by the civilized peoples of the Mediterranean, received a considerable extension through the military expeditions of Alexander the Great. Alexander, as is well-known, penetrated to northwest India and made war upon its princes. He himself travelled down the Indus and sent out a fleet from its delta, under the command of the general Nearchus and the navigator Onesicritus, with orders to return to the Persian Gulf from the mouth of the great river by way of the sea. Hence the voyage was to be extended to the upper end of the Red Sea, but this part of the plan was never executed on account of Alexander's death. "Nearchus' periplus" was begun in September, 326, B. C. It was then considered an exceedingly dangerous venture and was praised as the most magnificent naval exploit of antiquity. It is minutely described in ARRIAN'S Indian history, written in



59. Map of Egypt, 1570. From LAFRERI'S atlas. (Original size 0.338 x 0.260 m.)

107), the Indian country is the furthest of all inhabited countries. There the quadrupeds and birds are bigger than in any other country, there gold is fetched in great quantity from mines and the sands of rivers, and the wild trees bear as fruit a kind of wool which surpasses sheeps' wool in beauty. Towards the south, Arabia is the furthest of all countries in the world.

The part of Asia then really known by the Greek people thus seems to have been bordered on the east by the desert countries beyond the Tigris and on the south by the Arabian peninsula. It was not till about a century later that the known

the 2nd century A. D., but evidently based on Nearchus' own description now lost.¹ In order to give an idea of oceanic navigation at the time of Alexander the Macedonian, I shall here give a translation of the parts of this work that directly concern navigation.

Nearchus' periplus from Arrian's work on India.

21. When the etesian winds had ceased, which all the summer through blow from the sea towards land and thereby hinder navigation, then they set sail. Cephisodorus was then archon at Athens, and it was the twentieth day of the month Boedromion, according to Athenian reckoning; but ac-

¹ For the extensive literature about Nearchus' periplus I have to refer to WILLIAM VINCENT: *The commerce and navigation of the ancients in the Indian Ocean*, 2 vols., 4to, London 1807, also CARL MÜLLER, *op. cit.*, I, pp. 306—369.
A. E. N. II.

Cophas. There lived fishermen who had small and bad boats which they rowed with oars, not after the Greek custom attached to thole-pins, but as on a river, throwing the water to one side and the other in the same way as those who dig the earth. At this harbour they found pure water in abundance. About the first night-watch they weighed anchor and arrived after a voyage of 800 stadia at Cyiza. The shore being desolate and full of breakers, they rode at anchor and took their meal on the ships. After having sailed thence 500 stadia, they came to a small town which was situated on a hill not far from the shore. Nearchus considering it probable that the country was cultivated, said to Archias (son of Anaxidotus of Pella, with a high reputation among the Macedonians and now a fellow-voyager of Nearchus) that they must take possession of this town. For he did not believe, he said, that the inhabitants would voluntarily give the army provisions; while to take the town by storm would not be possible, but they would need the delay of siege; and provisions were already wanting. But that the country was rich in corn, might be inferred from the corn-stubble, which they saw growing thickly not far from the shore. This proposition being approved of, he commanded the other ships to be got ready as if for sailing, and while Archias took charge of this, he himself, left behind with one ship, went as though he only wanted to look at the town.

28. Arrived at the walls, the citizens met him with gifts, consisting of tunnies baked in earthenware crocks (for these people who lived furthest away of the Ichthyophagi were the first they saw not eating the fish raw), with a few cakes and dates from the palms. Nearchus said that certainly he would willingly accept the gifts, but that he wanted to view the town; and they allowed him to come in. But when he was once inside the gates he commanded two of his archers to hold the postern, while he himself with two others and the interpreter mounted on the wall hard by, and from there he signalled to Archias and his men; for they had previously arranged that Nearchus was to signal and that Archias interpreting the signal should act accordingly. When therefore the Macedonians saw the signal they at once steered the ships towards land and jumped with haste into the sea, while the barbarians, panic-struck at what had happened, rushed to arms. But the interpreter with Nearchus shouted aloud that they were to give the army grain if they wanted to save their town. They, however, denied that they had any, and at the same time they made an attack on the wall. But the archers who were standing near Nearchus, shooting from their higher position, drove them back. When they perceived that their town was taken already and only not yet sacked, then they begged Nearchus to take all the grain they had and to withdraw, but to spare the town. Nearchus then bade Archias occupy the gates and the adjacent wall, while he himself sent men round to seek out the grain, so that the inhabitants should honestly produce what they had. And they did produce a quantity of flour ground from dried fish, but little wheat or barley; for it was the custom of the country to use fish as the staff of life, but bread as a luxury. When what there was had been produced the Macedonians provisioned themselves from it and put out to sea, and they anchored near a rocky point which the natives held sacred to the sun. This point was called Bagia.

29. Starting thence about midnight, they sailed on 1000 stadia to Talmena, a safe harbour. After having sailed from here 400 stadia, they came to a deserted town called Canasida. There they found a well sunk, near which palm-trees were growing. They cut off the heads of these and ate them; for the army was already in want of provisions. Tortured by hunger they then sailed the whole day and the following night, and cast anchor by a desolate coast. But since Nearchus feared that his men would desert the ships from despair if they were allowed to land, he ordered the ships to ride at anchor on the open sea. Leaving there, they sailed 750 stadia and arrived at Canate, where was a low shore with shallow channels. Thence they sailed 800 stadia and put in to Tai. Here were some small and wretched villages, whose inhabitants left their dwellings. But they found a little grain and dates; also they killed seven camels which had been left behind, and feasted on their flesh. Starting again at dawn, they sailed 300 stadia and cast anchor at Dagasira, where dwelt some nomads. Leaving there they sailed the whole night and the following day without any stop, and after having travelled 1100 stadia they sailed beyond the tribe of the Ichthyophagi, along whose coast they had suffered much through want of necessities. They did not land, however, but cast anchor in the open sea, since the surf stretched far from the shore. The length of the voyage along the coast of the Ichthyophagi was a little more than 10000 stadia. These Ichthyophagi live on fish, whence they derive their name. But only few of them carry on proper fishing, for only a few have boats for this purpose or understand the art of fishing, but most of their fish is taken when the tide is going out. For this purpose some have made nets, many of them with a length of two stadia. They make the nets of palm-tree bast, twisting it like flax. When the sea retires and the land is left, the part of the land which is left dry is generally without fish, but where there are any deep parts some of the water is left, and in it is a fair quantity of fish. Most of it, it is true, is small fish, but larger also occur. This fish they take by casting the nets. The most delicate ones they at once eat raw as they are drawn from the water, but the larger and tougher they dry in the sun, and when they are dried through they grind them into flour of which they make loaves. Some also make porridge of this flour. They even feed their cattle on dried fish, for the country lacks meadows and does not grow any grass. In these parts they also catch a quantity of crabs, oysters, and other shell-fish. Salt is a natural product of the soil. . . . Those that live in the desolate parts which lack both trees and cultivated products live exclusively on fish; only a few of them sow some of the land, and then they use the bread as a relish to the fish; for fish is their bread. The richest of them build houses in this way: they select bones from any

whales cast up by the sea and use them instead of timber; of the flattest bones they make the doors. But the poor, who form the larger number, build their houses of fish-bones.

30. Great whales live in the outer sea [the ocean] and fish much greater than in this inner sea [the Mediterranean]. And Nearchus relates that, as they were sailing along from Cyiza, at daybreak they saw water being thrown up from the sea as though it were lifted up by the force of a hurricane. They then in fear asked the pilots what this might be and what was its cause, and they answered that these whales floating on the sea spouted up its water: then the oars dropped from the hands of the sailors, so afeared were they. But Nearchus went up to them and encouraged them to take heart; and he ordered that each time they sailed by any whales, they were to charge them with their prows as in a sea-fight, and were to row with rapid strokes, adding their shouts and rattle of the oars to the rushing noise of the water. Thus encouraged, all began to row at a given signal, and as they approached the beasts, they shouted as loud as their lungs would let them, the trumpets sounded the charge, and the stroke of the oars resounded far and wide. The whales, when they saw the prows of the ships upon them, were seized with fear and plunged into the depths, but before long came up again astern and again blew up the sea to a great height. Then clapping of hands arose among the sailors for their unexpected safety, and they praised Nearchus for his daring and wisdom. One or another of the whales occasionally comes too near the shore and is kept in the shallows when the tide retires; others are thrown on shore by violent winter-storms, and thus perish and decay, and the flesh falling off leaves the bones to be used by the natives for their houses. The large ribs are selected for beams in the houses and the smaller ones for rafters; the jaw-bones are used for doors; for many whales are up to 25 fathoms long.¹

31. As they were coasting the country of the Ichthyophagi they heard tell of an island, which was about 100 stadia from the nearest main land and without inhabitants. The natives said that this island was sacred to the sun and was called Nosala; nor would any of the people land on it; but if any one unwillingly did come there he was no more seen. Nearchus says that they saw a boat-full of Egyptians disappear not far from this island, and the pilots declared that the crew of the boat approached the island out of ignorance and disappeared. Nearchus, however, sent a boat of thirty oars to go round the island and ordered them not to land, but to row as near in as possible and shout to the men, calling on the steersman or any other whose name was distinct. But since none answered, he says that he himself sailed to the island and forced his men to land although against their will. He then went on shore himself and thus showed that the tale about the island was only an empty myth. There was yet another story they had heard told about this island: one of the nereids had lived there, but the name of the nereid was not mentioned; and whoever chanced to approach the island, with him she lay, then turning him from a man into a fish threw him into the sea. For this the Sun-god was angered with the nereid and commanded her to move her home from the island. She, while promising to move, begged that the wrong she had done might be mended. The Sun-god permitted this, and in pity all whom the nereid had turned from men into fish he again turned into men. And it was from these that the race of Ichthyophagi had descended down to the time of Alexander. I for my part by no means praise Nearchus for having wasted time and thought in disproving things which were not particularly difficult to disprove; for I consider it a wretched business to criticise and prove the falsity of ancient legends.

32. In the interior above the Ichthyophagi, the Gadrosii inhabit a barren and sandy country, where the army of Alexander and Alexander himself had to suffer many hardships, as I have told in another place. When the fleet came to Carmania from the country of the Ichthyophagi, at the first place where they stopped in Carmania they rode at anchor in the open sea, since a rough surf stretched far out to the sea. From here they did not sail towards the setting sun any longer, but held a course between the sunset and the Great Bear. Thus Carmania is more woody and fertile than the country of the Ichthyophagi or Oritae, and richer in grass and water. When they came to Badis, a populous place in Carmania, they found many cultivated trees, with the exception of olives, growing naturally, excellent vines and much grain-produce. Weighing thence, they travelled 800 stadia and landed at a desolate coast; and from here they saw a huge promontory stretching far out into the sea; it seemed to lie at a distance of one day's sail. Those who were acquainted with these parts said that this promontory proceeded from Arabia, that it was called Maceta, and that cinnamon and other such things were brought from there to the Assyrians. From the part of the coast where the fleet now lay at anchor and the promontory which was seen to project into the sea from the opposite side, a gulf stretches inwards, which seems to me as it seemed to Nearchus to be in all probability the Erythrean Sea. When they saw this promontory, Onesicritus proposed to sail in that direction so as to escape the suffering they might meet with if they rowed along the gulf. But Nearchus replied that Onesicritus were foolish if he did not understand for what purpose Alexander had sent the expedition. He had not sent out the ships because he could not lead the whole army unhurt over land, but because he wanted all coasts circumnavigated by them to be explored, as also the harbours and islands, and any gulf they came upon to be sailed up and round, and the towns situated on the sea to be noted, and which parts were fertile and which were desert. They ought not to bungle the whole enterprise when they had already seen an end to their hardships, especially as they were no longer in want of necessities for the voyage; he also feared that since the promontory extended southwards they might meet with a desolate and scorched region without water. These reasons conquered, and it is very clear to me that Ne-

¹ The species of whale here in question is probably *Balaenoptera Indica*, which reaches a length of 90 feet and is chiefly found in the Bay of Bengal and the Arabian Sea, on the coasts of which it is often stranded. It is related to, perhaps identical with, *Balaenoptera Sibbaldi* of northern seas (W. T. BLANFORD: *The Fauna of British India*, p. 567, London, 1891).

archus saved the fleet by this counsel of his. For report has it that that promontory and the whole country round is a desert with the greatest want of water.

33. They now weighed anchor and sailed away, keeping near land; and after sailing 700 stadia they landed at another shore called Neoptana. At dawn they again put out, and after having sailed 100 stadia they came to the river Anamis; the place itself was called Harmozia. Here was a friendly population and fertile soil, though it did not grow olive-trees. Here they disembarked, well pleased to rest from their many labours, calling back to their memory the evils they had suffered on the sea, and in the country of the Ichthyophagi, the desolation of the land, the wildness of the people, and their own want of provisions. Some of them went up from the sea into the interior, straggling from the main body in search of one thing or another. And there they saw a man who wore a Greek mantle, whose whole equipment was Greek, and who spoke the Greek tongue. At the first sight of him they burst into tears, so they said; so unexpected did it seem to them after all their trouble to behold a Greek man and to hear the Greek tongue. They asked whence he came and who he was. He answered that he had wandered from Alexander's army and that the camp and Alexander himself were not far off. This man was brought to Nearchus with shouts and clapping of hands. And he told Nearchus everything, how that the camp and the king were five days' journey from the sea. He also said that he would introduce the governor of the country to Nearchus, which he also did. And with the governor Nearchus took counsel how he should go up to the king. Then they returned to the ships. But as soon as it was dawn Nearchus had the ships drawn up on shore, partly in order to repair those that had been damaged on the voyage, partly because he decided to leave the greater part of the crews there. He surrounded the naval camp with a double palisade, a rampart of earth, and a deep moat which he led from the bank of the river to that part of the shore where the ships were drawn up.

Through the voyage of Nearchus the Greeks became acquainted with the coast-countries of northwest India, Gedrosia and Carmania, and during the times immediately following, intercourse with the natives brought them fragments of information about the rest of India, the Ganges, and the parts of Asia beyond that great river. This information is collected in ARRIAN'S above-quoted work on India, most of it after Megasthenes, who probably took part in Alexander's expedition and who subsequently served Seleucus Nicator during his dealings with the Indians and was sent by him as ambassador to the princes of the country. He had visited the Ganges and was acquainted with the river-system of India.

Tidings had also come concerning those most easterly countries, Chryse and Thine, whence cotton and cotton goods were exported by land as well as by sea to Barygaza, the present Broach, on the west coast of India on the river Nerbudda. "But it is difficult to get to Thine, and one seldom meets anybody from there. . . . The country beyond cannot be explored, either because it is inaccessible in consequence of cold and severe tempests or else on account of some divine fate." (Periplus of the Erythrean Sea, 63—66.)

From what Arrian writes after Nearchus, Megasthenes, and others, it appears that the Greeks' knowledge of the Asiatic littoral beyond the Indus during the 2nd century A. D. remained imperfect and dependent upon old stories at second or third hand. Strangely enough there was no clear conception of the shape of India. It is true that Megasthenes said that the country had its greatest extension north and south; but Eratosthenes seems to regard India as a slightly projecting stretch of land between the Great Sea and the Taurus mountains where the rivers Indus and Ganges rise, *i. e.* something like the way in which the distribution of land in south and east Asia is given on the map of the world reproduced on fig. 2. This conception was subsequently embraced by Ptolemy, as is seen from the tenth map of Asia in his Geography (Facsimile-atlas, pl. XXV).

However, during the five centuries that elapsed between Alexander's military expedition and the composition of Ptolemy's Geography, there arose rather a brisk sea-trade between Egypt and India. At first it proceeded from port to port along the coast, whereby sailors were exposed to the difficulty of passing all shallows and points, of finding safe anchorages, and of protecting themselves against the brigands and pirates who were on the watch for prey in the hiding-

places of the coast. A change in this navigation took place during the first decades of our era. As in several other seas, the winds in the north Indian Ocean are subjected to regular changes: thus, for six months of the year they blow from the mouth of the Red Sea to the northwest part of India, and for six months in the opposite direction. This discovery was first utilized by the Greek navigator Hypalus to sail direct, in shorter time and avoiding the dangerous coasts, from Ocelis on the Arabian side of the Red Sea not far from its mouth, to Muziris on the northwest coast of India, and thence, when the wind changed, back to Ocelis. The monsoon, changing with the seasons, which made this voyage practicable, therefore received according to PLINY (VI: 23) the further name "Hypalus".

According to information received by Pliny shortly before he wrote this ("nec pigebit totum cursum ab Aegypto exponere, nunc primum certa notitia patescente") a trading voyage to India took:

from Alexandria on the Nile to Copto	12 days
" Copto with caravan to Berenice	12 "
" Berenice to Ocelis	30 "
" Ocelis direct with "Hypalus" to Muziris .	40 "

or 94 days in all, of which 70 were by sea on the Indian Ocean or the Red Sea. Muziris (the present Mangalore) became a large trading place, the Alexandria of India, where also, if one may credit the Tabula Peutingeriana, a temple of Augustus was erected.

Hypalus' new route for navigation is remarkable as having been the first time that the sailor on the ocean ventured to choose the route out of sight of land. If the example had at once been followed also on other seas, Hypalus would have been the pioneer of a great reform in communication by sea. It was forgotten, however, and nearly a thousand years passed before the sailors of Scandinavia, and nearly another five hundred before those of Portugal, showed that with properly built ships navigation on the open ocean was more secure against accidents than sailing in the immediate neighbourhood of land.

Thanks to Hypalus the communication by sea between Egypt and north west India, during the Roman Empire at all events, became more safe and secure, than if it had still been dependent on the disordered and changing political conditions on the north coast of the Indian Ocean. This was governed by the Parthians, always hostile towards Rome, and by the Arabians, never completely conquered. The importance attached by the emperor Augustus to the Indian trade, is further shown by the fact that for its protection he fortified various conveniently situated places on the coasts of Arabia, and maintained a permanent fleet in the Red Sea. Ambassadors came to Augustus from India. He says, at least, in a Graeco-Latin inscription which is partly still extant in a temple in Ancyra: "Ad me ex India legationes saepe missae sunt, numquam antea visae apud quemquam principem romanum." Under Claudius, Annius Placamus, a released slave, who had rented the taxes in Arabia was stormdriven to Taprobane, where he stayed long enough to learn the language. He gathered extensive information about the large island and persuaded its ruler to send four ambassadors to Rome. (PLINY, VI: 22.)

That even later information came from Taprobane to Alexandria, is proved by a comparison between Ptolemy's map (Facsimile-atlas, pl. XXVII) and Pliny's report of Placamus' account. Possibly the new information about the distant countries came to Egypt through direct trade with Taprobane, the Ganges, Aurea Chersonesus (Malacca), and some of the islands of Austral-Asia. At least, a number of islands in the Indian Ocean are mentioned by Ptolemy and marked on his maps, though in a manner that makes it impossible to identify them with those actually in existence.

After Ptolemy it does not seem as though any further information about this part of Asia of a comprehensive character reached the Greek and Latin world. *The Periplus of the outer sea*, which goes under the name of Marcianus and probably dates from the 5th century, is, to judge from the fragment still extant, only a compilation from Ptolemy's atlas without any additions to show a wider knowledge of the countries and seas here in question.

Arrian's geographic conception of East Asia, correct in the main, is exchanged in Ptolemy's atlas for a drawing of land-contours around the whole of the Indian Ocean, which thus becomes an inland sea surrounded on all sides by land. But in this conception of the world-image, deviating as it did from the songs of Homer and the narratives of Herodotus, the Alexandrine geographer, in other respects con-

geographers of the classical period. "Taprobanen alterum orbem terrarum esse, diu existimatum est, Antichthonum appellatione. Ut liqueret insulam esse, Alexandri Magni aetas resque praestitere." (PLINY, VI: 22.)

It is true that even during the first thousand years of our era original information occasionally arrived from the more distant parts of Asia, for instance through the friar Cosmas Indicopleustes (first half of the 6th century), who had visited India as a merchant, through Arabian merchant-geographers,¹ and others. But on the whole our knowledge of the distribution of land and water in south and east Asia remained where it was left by classical antiquity down to the 13th century, at the middle of which the communication between the countries of the Old World farthest west and farthest east was introduced or resumed, to begin



60. Asiae Majoris pictura. From SOLINUS-MELA, Basileae 1538. (Original size 0.324 x 0.245 m.)

sidered infallible, had hardly any followers. Most cosmographers of antiquity and the Middle Ages continued to suppose that the Ocean formed a connected world-sea surrounding the three known continents, Europe, Africa, and Asia—the *known continents*, for the possibility of other worlds, of antipodes and antichthones, was already discussed by the

with by ambassadors to Central Asia from the head of the Christian church and the king of France, subsequently through enterprising merchants from the trading towns of Italy.

In the first place these embassies were due to fear of the Mongol power, whose hordes had already conquered and devastated Russia and the greater part of Poland and

¹ Various statements about navigation in the Indian Ocean, about the islands situated there, about China and other places, are given in an Arabic work of the 9th century, translated into French [by E. RENAUDOT] under the title: *Anciennes relations des Indes et de la Chine de deux Voyageurs Mahométans qui y allèrent dans le neuvième siècle*, Paris 1718. Subsequently the original text together with a revised translation, accompanied by explanatory notes, was published by J. T. REINAUD, Paris 1845. In this work, rich in interesting details, it is said among other things that an Arabian ship had recently been stormdriven from the Arabian seas to the Mediterranean. Here we also find the first notice of Japan (Zapage)—situated out in the sea at a distance from China corresponding to one month's navigation (RENAUDOT, p. 75). Ceylon and the Sunda Islands were also known to the Arabian authors. As regards the communication by sea between Arabia and China previous to the appearance of the Portuguese in the Indian seas, I must refer to F. V. RICHTHOFFEN: *China*, I, Berlin 1877, and to the bibliographic references there contained.

Hungary, and from there seemed to threaten the whole of Europe with ruin. The hope of help was founded on a legend which arose in the middle of the 12th century and was widely circulated within the Christian world and long believed in by peoples and princes with a childish simplicity; it said that there was a Christian priest-king in East Asia, called "Prester (Presbyter) John"¹ who, with a mighty host had tried to succour his fellow-believers in the Holy Land, and from whom assistance might be expected in the desperate struggle which was going on between the Christian and the Mahometan world. This state of affairs induced Pope Innocent IV, at the council of Lyons in 1245, to decree the sending out of two Apostolic missions to Central Asia, the one consisting of Franciscans, among whom was Giovanni Piano Carpini (Jean du Plan Carpin), and the other of Dominicans. About the same time (1253) St. Louis sent out the Franciscans, Guillaume Rubruquis (Rubruck or Ruysbrock) and Bartholomaeus of Cremona, with letters to the mighty Tartar-khan (the great Khan of Tartary).

Carpini's and Rubruquis' descriptions or reports of their journeys are still extant.² Carpini's account is of small geographical importance. Rubruquis on the contrary supplies many interesting contributions to our knowledge of social and political conditions on the wrestling-place then formed by East and Central Asia for different tribes and rapidly changing powers. A description of the Caspian Sea is given in the 20th chapter. Rubruquis and a Franciscan, Andreas, had travelled round it by land, Rubruquis along the western and northern shores, Andreas along the southern and eastern. They found it to be an inland sea surrounded by land. The supposition of ISIDORUS³ and other geographers that it might be connected with the Ocean was thus proved incorrect. In Rubruquis one meets with the names Jaik (Ural) and Sibir. He knows that in the northern countries of Asia dogs are used as beasts of draught. In chap. 36 there are various statements about the empire of the Great Khan. Rubruquis here states that "Cataia" is situated on the Ocean, and that a French gold-smith in Karakorum had told him that there were people called Taute and Manse living on islands round which the sea used to freeze in the winter; so as not to be attacked by the Tartars they paid a considerable tribute to the Great Khan. Through Rubruquis some information about the littoral of north-east Asia thus reached Europe. The travelling descriptions of Carpini as well as of Rubruquis circulated but slowly, and were not published in print till the 16th century. No great influence on the knowledge of our globe can therefore be attributed to these reports on official embassies to the country of the Great Khan, written perhaps in too sober a style.

It was otherwise with the travelling-descriptions of Marco Polo, which not only were received at once as a contribution to the literature of the world, but also helped to form that leaven of inquisitive and expectant anxiety which created the era of the great geographical discoveries.

MARCO POLO (Marcus Paulus Venetus) was born about 1254 in Venice and died there in 1324. His father Nicolò

and uncle Matteo (Maffio) Polo were Venetian merchants and patricians. They had come to Constantinople about 1260 with a cargo of valuable goods, which were disposed of at a great profit. In order still further to increase their capital they undertook a trading voyage from here to Soldaia in the Crimea and to Bolgar⁴ on the Volga. After having stayed for a whole year at the court of the Tartar Khan they purposed returning to Venice. Disturbances among the tribes of the Black Sea forced them to take a long round about way east of the Caspian. By this route, after further peregrinations, they finally arrived, whether of their own will or no, at the palace of Kubla-khan or the Great Khan. There they were very well received, but had difficulty in getting leave to return home, until at last they were employed on an embassy which Kubla-khan in 1266 sent to the Pope. The Tartar chief of the embassy died or was left behind ill on the way. The journey from the palace to Asia Minor took three years. In the meanwhile the Pope died, and a long interregnum followed before a new head of Christendom (Gregory X, 1271—1276) was elected. The return journey, therefore, could not be begun before 1271, and it was not till 1275 that the ambassadors returned to the ruler of Mongolia. Nicolò Polo took his son Marco with him on this journey. Marco is said to have been born in 1254, and was therefore a youth of 21 at his first meeting with Kubla-khan. He soon became a great favorite with the Khan and was made his highly trusted councillor. In that capacity he undertook extensive journeys in the wide-stretching empire of the Khan, took part in his war-expeditions, and was employed as ambassador to the neighbouring states. After having been in the service of Kubla-khan for seventeen years, in 1292 Marco was charged to conduct to Persia a Mongolian princess, aged seventeen, the destined wife of the ruler of Persia, Argun-khan, a relative of Kubla-khan. The journey was undertaken by sea, on 13 vessels, each with four masts. The ships were supplied with provisions for two years. The suite of the princess consisted of 600 persons, not counting the sailors, but of these the greater number had perished before Marco Polo handed over the princess to a nephew of her first choice, who in the meantime had died. Then Marco Polo, with his father and uncle, continued his journey home and returned in 1295, by way of Tabriz (Tauris) and Constantinople, to Venice.

Here Marco Polo made a great sensation owing to the wealth he brought with him and his descriptions of all the strange and remarkable things he had experienced. He evidently did not get full credit, and the people gave him the nick-name "il milione", in reference to the large numbers, incredible at that time, which he used when discussing questions of distance, population, or treasure in the domains of Kubla-khan. Three years after his return home he took part in a war between Venice and Genoa, in which he was made prisoner in the sea-battle of Curzola in 1298, in which the Venetians were beaten. To break the monotony of his prison-life, he dictated to a fellow-captive, Rusticiano of Pisa,

¹ For the origin and development of this legend reference may be made to GUSTAV OPPERT: *Der Presbyter Johannes in Sage und Geschichte*, 2te Aufl., Berlin 1870. It is to be noticed that Prester John had a double. This name first designated a supposed king in East Asia, but it was subsequently transferred to the ruler of Abyssinia. On old portolans "Presbyter Johannes" is therefore to be seen with mitre and crosier in hand drawn near Abyssinia, e. g. on the portolano reproduced here on pl. XXIII. In chapter LXXI of *Libro del conocimiento de todos los reynos* etc. (vide supra p. 79) of the 14th century he is called "preste iohan", and his standard is described and drawn.

² The account of Carpini's travels was first printed "in Vinegia per G. Antonio de Nicolini da Sabio" 1537, with the title: *Opera dilettevole da intendere nella quale si contiene doi itinerari in Tartaria* etc.; subsequently in part II of RAMUSIO, in the 2nd edition of HAKLUYT's *Principal navigations*, as well as in PURCHAS, BERGERON, KERR, and other well-known collections of travels. In *Recueil de voyages et de mémoires*, publ. par la Soc. de géogr., Paris 1839, D'AVEZAC with his well-known precision and care has published a complete edition after original MSS. in Leyden, Paris, and London, with explanatory notes and a historical review of previous journeys in Central Asia.

The account of Rubruquis' journey was first printed in the HAKLUYT, PURCHAS and BERGERON collections. For the literature concerning this, further reference may be made to FR. V. ADELUNG: *Kritisch-literarische Übersicht der Reisenden in Russland bis 1700*, I, St. Petersburg—Leipzig 1846, p. 96.

³ In book XIII, chapter 17 (ed. Venetis 1483) ISIDORUS says: "Sinus dicuntur majores recessus maris ut in mari magno ionius, in oceano caspius, indicus, persicus, arabicus, quem et mare rubrum qui oceano ascribitur. Rubrum autem mare vocatum, eo quod sit roseis undis infectum." ⁴ Not to be confused with the present Bulgaria. "Bulgaros quasi Volgaros a Volga, unde emigraverint, flumine dictos, sunt qui existimant, ut scribit in suo itinere Busbequius." (ORTELIUS: *Thesaurus Geographicus*, Hanoviae 1611).

who knew how to write, the story of his journeys and adventures in Central Asia.¹

This account, originally written in French(?), was subsequently circulated in different languages in a number of manuscript and printed editions, of which latter four or five were published during the 15th century,² the first in 1477 in German at Nuremberg.

Under conditions particularly favourable for the acquisition of geographical knowledge, Marco Polo had travelled through Asia from west to east, and it was from him that the civilized peoples of Europe received their first real knowledge of the rich and vast countries of East Asia. His style is simple and somewhat monotonous, but fortunately not marred by any parade of learning or quotations from Pliny, Mela, Solinus and the rest. He tells us of cities with millions of inhabitants, and of rivers far larger than all previously

known, not even excepting the Indus and Ganges. He speaks of a very large populous island, Chipangu, far out to the east in the ocean which washes the shores of Cathay. Through his journey home by sea he finally proved that the whole of Asia, at least from this island to Suez, was surrounded by the ocean, and he transmits to us various notes, gathered from native skippers and merchants, on the numerous large and fertile islands in the Chinese and Indian Seas, on Chipangu (Japan), Java, Sondur and Condur (the Pulo Condor islands), Pentam (Bintang in the east part of the straits of Malacca), Java minor (Sumatra), Necuveran (the Nicobars), Angamanain (the Andamans), Seilan, Madeigascar, Zanghibar.

Marco Polo's contributions towards the development of our geographical and ethnographical knowledge of our globe cannot be estimated too highly. Moreover his description of the riches of East Asia, with its frequent mention of huge



61. Asia in MÜNSTER'S geographical works 1540—1578. (Original size 0.347 × 0.257 m.)

¹ For Marco Polo's biography I must refer to the exhaustive introduction to HENRY YULE'S edition of Marco Polo's travels (*vide infra* 8). A remarkable uncertainty obtains in regard to a number of data in Marco Polo's history, which all the enthusiastic investigation of Marsden, Baldelli, Pauthier, and above all of Yule, has not been able to disperse. Yule has recorded 78 Marco Polo MSS. in different languages.

² In *Studi biografici e bibliografici*, I, Roma 1882, AMAT DI SAN FILIPPO enumerates 45 old MSS. and 55 printed editions, of which the following may be quoted here:

- 1) RAMUSIO: *Delle cose dei Tartari et delle Indie orientali*. Inserted in the second part of his collection of travels (*Raccolta delle navigazioni et viaggi*), printed at Venice in several editions 1550—1613.
 - 2) WILL. MARSDEN: *The travels of Marco Polo*, London 1818.
 - 3) *Les voyages de Marc Paul*. (*Recueil de voyages et de mémoires publ. par la Soc. de géogr.*, Paris 1824.)
 - 4) GIOV. BATTISTA BALDELLI: *Il Milione di Marco Polo* etc., Firenze 1827.
 - 5) AUGUST BÜRCK: *Die Reisen des Venezianers Marco Polo*, Leipzig 1845.
 - 6) VINCENZO LAZARI: *Viaggi di Marco Polo Veneziano*, Venezia 1847.
 - 7) M. G. PAUTHIER: *Le livre de Marco Polo*, Paris 1865.
 - 8) HENRY YULE: *The book of ser Marco Polo the Venetian*, London 1871, 2nd ed., 1875.
- Valuable commentaries and notes on the Marco Polo literature are also to be found in PLACIDO ZURLA (*Di Marco Polo e degli altri viaggiatori Veneziani*, Venezia 1818), and in the previously quoted work by FR. V. ADELUNG. A fine MS. of the middle of the 14th century which formerly belonged to the library of the French king Charles V, but is now in the Royal Library at Stockholm, has been published by me in facsimile under the title *Le livre de Marco Polo*, Stockholm 1882.

numbers, formed the direct incentive to Columbus' voyage of discovery, and on the whole to the desire for travel and adventure which characterised the 15th and 16th centuries in such striking contrast to the haughty indifference of antiquity towards foreign "barbarian" nations and countries. Immeasurable therefore was the influence exercised by Marco Polo on the geographical distribution of the white race. One must not suppose, however, that his accounts were at once accepted by the learned world as correct and reliable. Far from it. It is true that some of Marco Polo's discoveries were cartographically recorded on the Atlas Catalan, on Fra Mauro's planisphere, and on Behaim's globe. But the authors of these celebrated works were hardly the learned of their profession. In "Liber secretorum fidelium crucis" by the Venetian Marino Sanudo, completed some years after Marco Polo's return home, in the "Supplementum Cronicarum" of Jacobus Philippus Bergomensis, in Schedel's "Liber Cronicarum", in Corvinus' "Cosmographia", all of the end of the 15th century, in Reisch's "Margarita philosophica" of 1503, and in others, there is on the contrary no reference made to Marco Polo's description of East Asia. The same is also the case with the map of the world in Ptolemy, Ulmae 1482 and 1486, on which, however, the drawing of the Scandinavian peninsula, Pilappeland, and Iceland is inserted. Aeneas Sylvius (Pius II) knows nothing of Marco Polo, although he mentions "Nicolaus quidam Venetus cognomento comes". The tenth chapter of his cosmography has the heading: *De gente Atocorum . . . et quae de Macino provincia denarravit Nicolaus Venetus*. His belief in the chronicler seems, however, to have been very small. For he says: "Sed illud difficile est credere, quod de amne Dua commemorat, quem Gange majorem dixit; cui veteres cuncta cedere flumina tradiderunt. Nec illud dignum fide decem millia elephantum belli causa regem alere, nec notum esse, aut fama clarum." (Ed. Parrhisiis 1509, fol. 6 v.) Neither did Marco Polo's travels seem worthy of a place in Conrad Gesner's "Bibliotheca universalis" (1st Ed. Tiguri 1545). Innumerable other examples might be quoted in proof of the slight value attached to the great discoverer by the learned few down to the 16th century. But with the unlearned public the case was different. It accepted Marco Polo's descriptions, and in most cases quite justly, as revelations from a new world. Thus it was that they formed an introduction to the new era. They did not, however, exercise any real influence on cartography, until they had been confirmed in their main points by the Portuguese voyages of discovery.

At the time of Marco Polo and during the greater part of the following century, east and south Asia were visited by numerous other merchant-travellers¹ and missionaries, by whom there are more or less extensive accounts extant. They appear, however, to have exercised no great influence on our geographical knowledge of these countries and still less on their cartography. I therefore confine myself here to an enumeration of the more important.

Giovanni da Montecorvino was born in 1247 and died in 1328, and thus was a contemporary of Marco Polo. In 1291 he travelled to Persia, India, and China. In the account of his observations and experiences, he says that the Indian Ocean is not bounded by land on the south, but that it there contains more than 12 000 islands, some inhabited, some uninhabited (YULE: *Cathay*, p. 215).

Odorico da Pordenone travelled in 1318, by way of Constantinople, Trapezunt, and Armenia, to Bagdad, thence by sea to Ormuz and so on to India, as well as through

Ceylon, Madras, and Nicoveran (= the Nicobars) to Lamori (the present Sumatra), Java and Borneo, and finally to Canton (Censcalan) and Peking (Cambalec, Cambalu). Hence he returned, probably through Central Asia, and again reached Venice in 1330. He died in 1331 in Udine, glorified as a saint. His biography is therefore also inserted in BOLLANDUS' *Acta Sanctorum* under the 14th of January. An exhaustive monograph on his journeys has recently been published by HENRI CORDIER: *Les voyages en Asie au XIV^e siècle du bienheureux frère Odoric de Pordenone*, Paris 1891.

Giovanni dei Marignolli set out in 1338 with a great embassy from the Pope in Avignon, by way of Constantinople and the Crimea to Sarai, where they wintered. Hence the trade-route to Cambalu was followed, and in 1347 the return journey was undertaken by sea round India to Ormuz and Bagdad, and thence by Damascus to Avignon, whither Marignolli returned in 1353. (YULE: *Cathay*, p. 311.)

Nicolò dei Conti. After the dethronement of the Mongol dynasty in China in 1368, the country became barred to foreigners, and in consequence the missionary and trading-voyages to East Asia ceased. On the other hand voyages were still undertaken by merchants from the Mediterranean to India and the islands of Austral-Asia. The most important or best known of these is that of Nicolò dei Conti. During his homeward voyage Conti was taken prisoner by Mohammetan pirates, and turned to Islam in order to save his life. After he had come home he sought absolution from the Pope, whose secretary, Poggio, was thus led to write down the story of Conti's voyages and adventures. He had travelled far and wide. First from Egypt through Arabia Petraea to Babylon (Baldachia), thence to Ormuz, India, Ceylon, Sumatra, Tenasserim, Borneo, Java, Banda, and other islands in Austral-Asia. The return journey was also undertaken by sea by way of India, Socotra, Aden, and up the Red Sea to Egypt. Conti is the only European traveller during the Middle Ages who, for the voyage back from India, chose the Red Sea route instead of the ordinary one by Ormuz and the Gulf of Persia. For the bibliography of Conti's voyages, which have often been published in print and commented on, I must refer to AMAT (*op. cit. supra*, p. 132).

Through these and various other commercial and missionary voyages of like nature, more or less confused accounts of the littoral of Asia and the outlying islands were circulated among the influential men of the Christian church, as well as among the sailors and merchants in the coast-countries of the Mediterranean; and in that way they not only exerted a direct influence on our geographical and ethnographical knowledge of the immense region travelled over by these missionaries and merchants, but, as I have pointed out above, also contributed largely towards the awakening of that spirit of investigation which characterised the 15th and 16th centuries.

On the following maps and globes of the 15th century, the observations mentioned above are recorded:

1. Shortly after Marco Polo's return, his voyages were marked on one of the many maps that adorned the walls of the Sala dello Scudo in the Palace of the Doges. The four largest of these maps were of the end of the 13th century or the beginning of the 14th. One of them, comprising India, China, and the outlying islands, is said to have represented Marco Polo's voyages, and so far as they were concerned, this probably formed the foundation of Fra Mauro's planisphere. By the middle of the last century the originals

¹ The trading-voyages to these parts at the beginning of the 14th century were so numerous that an Italian, FRANCESCO BALDUCCI PEGOLOTTI, wrote a guide for travellers in the Far East under the title *Libro di divisamenti di Paesi*. Pegolotti had been employed by the commercial house of Bardi in Florence as a factor, first in Antwerp from 1315 to 1317, then in Cyprus 1324-27. His work was first published in print in 1766 after a MS. in an anonymous work on taxes and tithes etc., in the Riccardian Library at Florence. It has since been published with explanatory notes in SPRENGEL'S *Geschichte der wichtigsten geogr. Entdeckungen*, Halle 1782 (2nd ed. 1792), and by HENRY YULE: *Cathay and the way thither; Works issued by the Hakluyt Soc.*, London 1866.

were so spoilt by age that, in 1762, the cartographer Francesco Grisellini was commissioned to restore them. How far these redrawn maps correspond to the old ones I have not been able to find out from the literature accessible to me. (ZURLA: *Di Marco Polo* etc., II, Venezia 1818, p. 372; UZIELLI-AMAT, II, p. 47.)

2. *Atlas Catalan* of 1375 (N. T. XI—XIV). The importance of this work for the cartography of East Asia may be gathered from the literature quoted on p. 58, and from HENRI CORDIER's exhaustive and erudite monograph: *L'extrême Orient dans l'atlas catalan de Charles V, Roi de France*, Paris 1895 (*Bull. de géogr. historique et descriptive*). According to Cordier, the author of the *Atlas Catalan* took almost all his facts about China from Marco Polo, though he paid no attention to many of the latter's observations. The isle of Zipangu, for instance, is not marked. Moreover several of the legends suggest that yet other sources, whether written accounts or oral information, were used by the portolan-draughtsman.

3. A copper-plate map of the world, which dates from the first half of the 15th century, and belonged to Cardinal STEFANO BORGIA. It is here reproduced on pl. XXXIX (*cf.* pp. 84 and 116). The map is highly interesting, although from a geographical point of view it will not bear comparison with the portolanos of the Mediterranean or the portolan-maps of the world. The drawings of carts etc. in Central Asia show that original information from those parts was at the disposal of the map-draughtsman, while the imperfect mapping of the Mediterranean and the Black Sea proves that the portolanos were unknown to him.

4. FRA MAURO's planisphere of 1459. That Marco Polo's account of his travels formed one of the sources of Fra Mauro's drawing of East Asia, is shown by the large islands Zimpangu and Java major marked on the eastern border of the planisphere, as well as by several of the long legends. It is also clear that numerous observations of other Asiatic travellers were at the disposal of the learned Calmadoleser, though the way in which he used this material as, for instance, in drawing the coast-line of Asia between the Red Sea and the Ganges, does not say much for his ability as a map-draughtsman.

5. MARTIN BEHAIM's globe of 1492. The drawing of Asia on this globe gives a representation of Marco Polo's travels and observations, elucidated by long legends. The map is, perhaps, not such as Marco Polo himself would have drawn, but, what is more important for the history of geography, such as his discoveries were conceived in the countries that equipped the exploring expeditions of Dias, Gama, Columbus, and Vespucci. Space does not permit an analysis of this work or of the many commentaries written on it. These are quoted on p. 128, where also the most important reproductions are enumerated.

6. *The Laon-globe* of 1493. On this metal-globe found in the town of Laon, copied and minutely described by d'Avezac (*cf.* Facsimile-atlas, p. 74 and fig. 41), the mapping of the Indian Ocean and East Asia is also based on Marco Polo, or perhaps more directly on Behaim's globe, although there are somewhat remarkable differences between these works, showing that the engraver of the Laon-globe had access to other sources than Behaim. The very drawing of the land-contours, moreover is based on cosmographic pre-

misses different from those of Fra Mauro and Behaim, in so far as the distance from Japan to the Azores on the Laon-globe is 75 degrees of longitude, while in Behaim it is 40°, and in Fra Mauro 180°. The actual distance is about 110°.

7. Planisphere by MARTELLUS GERMANUS, here reproduced in fig. 54 (*cf. supra* p. 128, and Facsimile-atlas, p. 57).

No other maps or globes made before Vasco da Gama's first voyage, and paying due regard to Marco Polo's discoveries, seem to be extant.

Thus, up to the beginning of the 16th century, exclusive of Tabula Peutingeriana and the wheel-maps of the Middle Ages, there were 3 different map-types for South and East Asia, namely:

I. Ptolemy's maps, founded on information acquired first on the military expeditions of Alexander and his companions and subsequently through the Egypto-Indian trade which flourished under the first Roman empire.

II. Arabic maps. After the time of the Alexandrian geographer, the knowledge of East and South Asia remained little changed down to the time of the political, commercial, and scientific greatness of the Arabian power. In a comparatively short time the religion of the Prophet, the power of the Caliphs, and the trading connections of the Arabian merchants were extended over North Africa, the western part of Asia, and a large part of Europe. From all regions whither Islam had penetrated, multitudes of pilgrims yearly streamed to Mecca, which thus, independently of all political disturbances, became a centre for the exchange of information between the parts of the world under the dominion of Islam, that is to say, from those very countries which had hitherto been the least known to the scholars of Europe. On the study of geography these conditions must have had a most favourable influence. And in fact the extant works of Arabian geographers from the end of the first and the beginning of the second thousand years of our era, are numerous and in many respects valuable.* But as I have already pointed out, the Arabs were no cartographers and there is hardly a trace of any influence exercised by them on the development of cartography. "Tabula rotunda Rogeriana ab Edrisio servata et descripta" (of the year 1154), which may be regarded as the most accomplished Arabian cartographical work, is, as Lelewel's reproduction proves, a spoilt Ptolemaic representation of the world, on which, however, some gigantic islands, arbitrarily placed in the Indian Ocean, vaguely suggest acquaintance, not only with Taprobane or Ceylon, but also with Java, Sumatra, etc. Still worse are the other extant maps by Edrisi, so far as I have been able to judge under the guidance of Lelewel's imperfect reproductions.

Consequently for the regions here in question Ptolemy is immediately followed by:

III. The maps quoted above as based on the travels of Carpini, Rubruquis, Marco Polo and others. These gave more or less definite information about China and its river-system, about the East Indian peninsula and its surrounding islands, about Taprobane and Madagascar.² Behaim's globe gives us an idea of the East Indian Archipelago as it was imagined by the interpreters of Marco Polo.

The Behaim-globe was hardly finished before the first voyage of the Portuguese to India gave a new turn to the geographical knowledge of this part of the globe, hitherto

* *Cf.* REINAUD: *Relation des voyages faits par les Arabes et les Persans dans l'Inde et à la Chine*, Paris 1845, as well as VIVIEN DE SAINT MARTIN, *op. cit.*, p. 258. These give good references to the authors that have published or monographed the Arabian geographers' works.

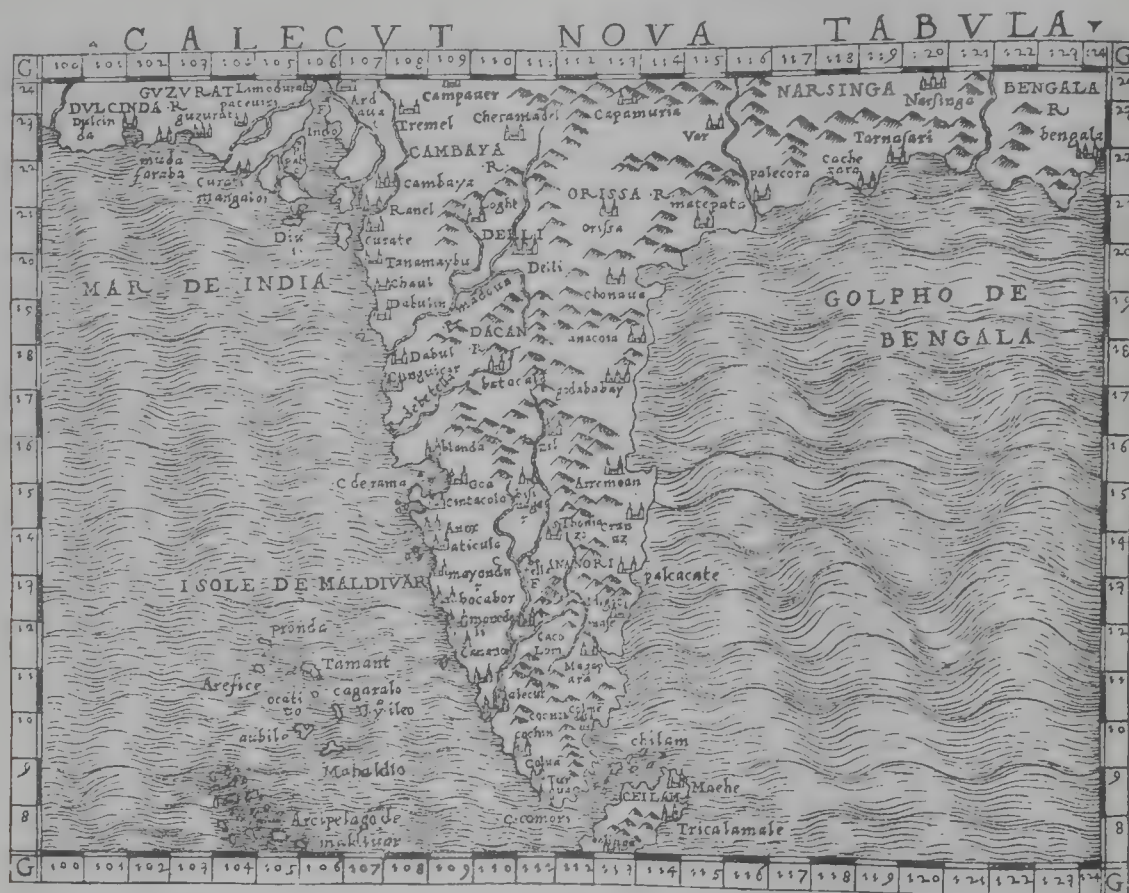
² After Marco Polo. His description of the natural history of the island does not, however, in most cases, at all agree with Madagascar, but rather with the east coast of Africa. In his great work, *Histoire de la géographie de Madagascar*, Paris 1885, GRANDIDIER therefore maintains that the Madagascar of Marco Polo had nothing in common with the island which now bears this name, but, in the same way as his large Zansibar, only meant part of the east coast of Africa. The ancient geographers designated Madagascar by the name Menuthias; various Arabian geographers subsequently had a more or less vague knowledge of this island, which was called by different names. Its true discoverers, however, were the Portuguese, who, shortly after Vasco da Gama's first voyage, laid it down under the name of S. Lorenzo on their new, and in the main fairly correct, map of Africa. Thus it was introduced on the anonymous map of the world belonging to Mr. Hamy, on the maps by Cantino and Canerio, and on others.

so difficult of approach. Gama's first voyage did not, however, effect any extension of our knowledge of the geography of India itself other than an exacter determination of the distance between Africa and India, already approximately known through the passages with the Hypalus-wind, and an improved charting of a short stretch of the west coast of the peninsula. But the enthusiasm with which Gama's achievement was hailed at home had for a long time an immense influence on the development of commerce and navigation. Not merely single vessels, but whole fleets fully manned, were despatched to India by the route that Gama had opened, in order to make conquests there and to procure strongholds on the coast, to force the natives into treaties of tribute and commerce, and, if possible, completely to abolish the Indo-Egyptian and Indo-Arabian trade. To describe these "exploits" so splendidly sung by Camoëns, does not lie within the scope of a purely geographical work. I shall only give a list of the events that are of chief importance for the history of cartography.

places on the south coast of Asia, to enter by fair means or foul into treaties that should give them the monopoly of profitable commerce with the natives, and with ruthless cruelty and violence to crush the trade of India with Arabia and Egypt, or, as it was termed, the trade with the Moors.

1497—1499. Vasco da Gama's first voyage (*vide supra* p. 124).

1500—1501. Pedro Alvares Cabral's voyage to India. The expedition, equipped under Gama's supervision, consisted of 13 vessels. On the outward voyage Cabral was driven towards the south-west and discovered Brazil about the end of April, 1500. The country was named Terra de Santa Cruz. On the 3rd of May he continued his voyage, after having sent one of the ships to Portugal with tidings of the great discovery and taken judicious measures for the exploration of the new country, including the friendly treatment of the natives. Subsequently, off the south point of Africa, the expedition met with a severe storm in which four ships were wrecked and many men perished, among them Bartolomeu



62. India by GASTALDI. From *La Geografia di Claudio Ptolemeo*, Venetiis 1548. (Original size.)

1486—1487. The rounding of the south point of Africa by Bartolomeu Dias (*vide supra* p. 122.)

1487. Pero de Covilham was sent out by the king of Portugal to investigate the political and commercial conditions in the countries around the Indian Ocean. He travelled as a merchant to Cairo, and then by ship to Cananor, Calicut, and Goa. Thence he sailed across to Africa, explored its eastern coast as far as Sofala, then returned to Cairo, whence he sent to Portugal an account of his most important observations. He advised the Portuguese to sail from the Guinea coast southwards to the south point of Africa, and thence to steer for Sofala and the Moon Island (Madagascar). Covilham himself started on a new expedition of discovery, first to Ormuz and then to Prester John in Abyssinia, where he was well received but not allowed to depart. He still lived there in 1525. Covilham's report on his travels seems to have determined the Portuguese in the future course of their Indian politics; they set themselves to seize strong trading-

Dias. Cabral himself continued along the east coast to Melinda, and thence to Anchediva and Calicut. Here a factory was established, which, however, was demolished shortly after, during a fight with the ruler "Zamorin".¹ In the summer of 1501, Cabral again anchored in the harbour of Lisbon. Of his thirteen ships he had lost five, he had not been very fortunate in the fight with Zamorin, and had, according to the ideas of the time, proved too gentle with the natives. The discoverer of Brazil was therefore less appreciated in his own country than probably he deserved. One of Cabral's ships, under the command of Diego Dias, separated from the rest in the storm at the Cape of Good Hope, and arrived at the east coast of Madagascar, which she subsequently followed to the north point of the island. Thus the eastern extension of this large island was approximately defined.

1501—1502. João da Nova's voyage to India. On the voyage out the island now called Ascension was discovered, and on the homeward voyage the Isle of St. Helena.

¹ According to HUMBOLDT (*Krit. Untersuch.*, III, p. 68) Zamorin is a distortion of the Sanscrit words "Samudriya Raja" = king of the coast region.

1502—1503. Vasco da Gama's second voyage. Gama left Lisbon on the 10th of February, 1502, with six large and nine smaller vessels, manned with 800 soldiers. He first sailed southwards along the coast of Africa to Guinea, and then across the Atlantic to Brazil, the coast of which country he followed as far as Cape S. Agostinho. Thence he sailed across to the Cape of Good Hope, then along the east coast of Africa as far north as Melinda, and finally to India, after having joined three more ships sent out from Portugal under Estevão da Gama. After having taken revenge on Zamorin by bombarding Calicut, Vasco da Gama entered into a commercial treaty with the Rajah of Cochin, and with great cruelty destroyed a number of Arabian trading-vessels, without even sparing either women and children. He then returned to Portugal, where the ships again anchored in September, 1503, richly laden with goods, gained by violence or by more or less compulsory barter with the natives. Some ships were left behind, under the command of Vicente Sodré, the first "Capitão do mar" in Indian waters. On a cruise between India and

On March the 25th, 1505, the first viceroy of India, Dom Francisco d'Almeida, set sail from Lisbon to India with 22 ships and 1500 fighting-men. He conquered Quiloa and Mombasa, and established forts and trading-stations at several places on the east coast of Africa. Then he sailed across to Anchediva on the west coast of India ($14^{\circ} 33' N.$), and there, on a small island close inshore, he erected a fort in which a garrison of 80 men was left. Subsequently Almeida occupied himself partly with the usual fights and intrigues against the princelets on the coast, partly with the chase of Moorish merchant-men. The Portuguese here carried on horribly cruel and unjust hostilities for sordid gain, and it is impossible to pardon the brutalities here committed, alas! after the example of the great Gama. He remained unsurpassed even in cruelty. At the same time one cannot but admire the great, if not always gallant, heroism shewn by the small band of Portuguese in the fight with enemies more than a hundred times their number. In chase of Moorish merchant-men, Lourenço d'Almeida, son of the viceroy, came



63. The East Indies by GASTALDI. From *La Geografia di Claudio Ptolemeo*, Venetiis 1548. (Original size.)

the Red Sea, for the capture of Arabian trading vessels, Sodré's ship was stranded on the south coast of Arabia and the whole crew perished. Gama himself, in the capacity of viceroy, in 1524 undertook a third voyage to India, and died shortly afterwards in Cochin, on December 24th, 1524.

In 1503 two squadrons were sent to India under the command of the brothers Francisco and Affonso d'Albuquerque. The Portuguese gained a firm footing in the country by means of a fort erected in Cochin, and with this began the era of Portuguese conquest in India. At the end of January, 1504, Affonso d'Albuquerque set out on his return voyage, which was the first to follow the route, not by way of Melinda, but across the ocean to Mozambique. On his voyage home, Albuquerque was accompanied by the Venetian, Bonavito d'Alban, who 22 years before had travelled through Egypt to India and had stayed a long time in Malacca. The future viceroy of India probably received from him important information about the almost unknown countries and islands situated further east.

for the first time to Ceylon, the Taprobane of the ancients, where he levied toll on a number of Moorish vessels on the way to Sumatra and Malacca.

In 1506 a fleet consisting of 15 ships, with 1300 soldiers, was sent out under the command of Tristão da Cunha and Affonso d'Albuquerque. As usual they sailed first to Cape S. Agostinho in Brazil, and thence across the South Atlantic to the Cape of Good Hope. On the passage from Brazil a more southerly course than usual was followed, and thus was discovered an island which was named after the commander, Tristão da Cunha. During the voyage Madagascar also was visited, and here the ships anchored at Angra da Concepção. Then Cunha sailed to Socotra, which was partly inhabited by a Christian population; and after this island had been conquered, he proceeded to the coasts of Arabia and Persia in order to capture Moorish vessels. A number of small coast-towns were sacked, but an attempt to take Ormuz failed. It was not till 1515 that this town, rendered of importance by its situation at the entrance to the Persian

Gulf, was taken by Affonso d'Albuquerque, who in the meanwhile had become viceroy of India.

Among the expeditions sent out from Portugal in 1508, two may be quoted here: one under Duarte de Lemos, the other under Diego Lopez de Sequeira. The object of the former was to capture vessels, to sack coast-towns, to erect new forts, and to succour old ones, in the East African and Arabian waters. Sequeira was to explore Madagascar and Malacca more thoroughly. He landed at St. Sebastian in Madagascar, sailed for some time along its shores and then over to India, where he received from the viceroy Almeida one more ship, under the command of Garzia de Sousa. He passed Pedir and Pacen, where he was received with kindness by the rulers. Some time after, he anchored in the harbour of Malacca, and was at first made welcome, but finally, at the instigation of Moorish merchants, was attacked while some of the crew were on shore. Many of his men were killed or made captive, and Sequeira was obliged to return. Sequeira, in order to prove the title to his rights as discoverer, erected *padrões* or stone crosses in many places.

In 1509 Affonso d'Albuquerque, *the great Albuquerque*, as the Portuguese called him, became commander in India. He was the founder of the Portuguese power in India. By 1510 he had taken Goa, which subsequently became the capital of the colonial empire. In May, 1511, Albuquerque, with a fleet of 19 ships and crews of 1400 men, sailed to Ceylon, Sumatra, and Malacca. A number of Moorish ships were captured. On the 1st of July, 1511, they anchored in the harbour of Malacca, and on the 25th the town was taken. Necessary steps having been taken to secure the new conquest, three ships were sent to explore the Moluccas. These *explorations* lasted from 1511 to 1513 and were, according to some chroniclers, conducted by Antonio d'Abreu, Francisco Serrão, and Simão Affonso Bisigudo. Their course was along the north coast of Java to Amboina. During the voyage Serrão's ship was wrecked. The crew was rescued, and a Chinese junk was acquired at Banda to replace the lost ship. From that time we often hear of Chinese and Malayan ships being used for European voyages of discovery. Serrão's junk, however, was also wrecked on a coral-reef south of Amboina, upon which he seized a pirate-vessel which lay at the time unguarded by the shore, and with it he returned to Amboina. Hence he travelled, on the invitation of the rajah, to Ternate. The news of Serrão's adventure having reached Malacca through Malayan trading vessels, a ship under Antonio de Miranda d'Azevedo was, in 1513, sent to fetch him. Serrão himself stayed behind in Ternate, but with the returning vessel he sent a letter to his friend Ferdinand Magellan in which he proudly referred to his great discoveries. He placed the newly discovered islands so far westwards that they came to lie within the line of demarcation of the Spaniards.

On February 18th, 1513, Albuquerque set sail with 20 ships and 2500 men, two-thirds of whom were Portuguese, to Aden, which he in vain tried to conquer. Then he sailed into the Red Sea, stayed for some time at the isle of Kamaran, situated near the coast of Arabia in 15° 51' N., and subsequently returned to India. This was the first time that European vessels had sailed into this sea, though it had been known from the earliest period. This time, however, the Portuguese could only investigate the southern part of the sea. It was first completely traversed in 1541, by Estevão da Gama. The Persian Gulf, on the other hand, was crossed in 1528, by Belchior de Sousa Tavaros, who sailed

from Ormuz to Basra at the mouth of the united Euphrates and Tigris.

On February the 21st, 1515, Albuquerque again went with a great fleet to Ormuz, and after various fights and intrigues, seized the town, or rather erected near it a Portuguese fort and persuaded the ruler of the region of the advantage it would be both for his own security and for that of the country, to deposit his cannon in the fortress of the intruders. After this exploit, Albuquerque returned to Goa and died on his ship in the sight of the harbour, on December 16th, 1515. He had adorned the crown of Portugal with its three most precious jewels: Goa, Malacca, and Ormuz, but died in disgrace deprived of the chief command, in consequence of intrigues at the court. Albuquerque's predecessor, Almeida, wanted to restrict the power of Portugal in India to the dominion of the sea, avoiding occupation of land, expensive to keep and difficult to defend. Albuquerque on the contrary wished to found a great Portuguese power in south Asia. Its most dangerous foe he considered to be the Sultan of Egypt. As an example of the greatness of his plans, it is stated that in order to coerce the latter he proposed to conduct the Nile by a new channel into the Red Sea.

From the further history of Portuguese discovery in the Indian and Austral-Asian waters the following may be quoted:

In 1517 a fort was erected at Colombo in Ceylon, the ruler of which place was made tributary.

In 1518 Dom Tristão de Menezes set sail for the Moluccas. He there took in a cargo of spices, not only for his own ship but also for four junks, and returned after various misadventures to Malacca.¹

In 1521 a large squadron was sent to the Moluccas direct from Lisbon, under the command of Antonio de Brito. At the request of the natives he erected a fort at Ternate and signed a commercial treaty with the ruler of the country. Previously sailors between Ternate and Malacca had always chosen the route south of Borneo. In order to investigate the fair-way north of this island, Brito in 1523 sent Simão d'Abreu from Ternate to Malacca by the north route. The same route in the opposite direction was taken by Jorge de Menezes in 1526. He was stormdriven by the west monsoon far beyond his goal, and thus became the discoverer of New Guinea, which was long considered the northernmost point of the great south polar continent marked on various maps of the 16th century. (See Facsimile-atlas, pls. XLVI—XLIX.)

Legends of countries, fortunately endowed by nature and rich in precious metals, have played a great part in the history of geographical discovery, and they all, perhaps with the exception of the only true one, namely Marco Polo's account of the land of millions, gained implicit belief for centuries. Such a gold-country was placed in the sea east of India. PLINY says (VI: 21): "Extra ostium Indi, Chrysae et Argyrae fertiles metallis ut credo. Nam quod aliqui tradidere, aureum argenteumque iis solum esse haud facile crediderim." On his 11th map of Asia, PTOLEMY calls the Malacca peninsula "Aurea chersonesus", and south of it there is placed an island with "Argentea metropolis". Subsequently the tale was repeated by Pliny's successors, SOLINUS and MELA (with the cautious addition "aut ex re nomen aut ex vocabulo fabula est") and by the mediaeval cosmographer, Isidorus of Sevilla (6th century),² the geographer of Ravenna (7th), Raban Maurus (8th), Hugo de San Victor (13th), and Pierre d'Ailly (15th). Inscriptions referring to these accounts occur not only in the Atlas Catalan and on the Laon globe, but also, as has been shown by Ruge, on several printed

¹ Magellan's circumnavigation of the world, during which the Moluccas were reached from the east in 1521, and after which the Portuguese got their first European rival in these waters, will be described in a following chapter.

² "Cryse et argire insule in indico oceano sitae adeo fecundae copia metallorum ut plerique eas auream superficiem et argenteam habere prodiderint, unde et vocabula sortitae sunt" (Ed. Venetiis 1483, book XIII, chapter VI).

maps down to the middle of the 18th century, e. g. on *Cartes des Indes orientales*, Homanns Erben, 1748.

It is natural that such an account should have had a strong influence on sailors and adventurers, greedy of gain. And so after the conquest of Malacca, several expeditions were sent out in search of these islands, the first in 1519 under Diogo Pacheco. I cannot here, however, dwell further on this episode in the history of geographical discovery, but must refer the curious reader to RUGE's excellent account in *Geschichte des Zeitalters der Entdeckungen*, Berlin 1881, p. 207.

The conquest of Malacca brought the Portuguese also into contact with the Chinese. As early as 1514 Rafael Perestrello, with ten companions, was sent to China by the commander in Malacca. Perestrello sent back a small ship richly laden with goods, but himself stayed in the country.

places, where the Portuguese had established themselves and had rapidly gained no little wealth, were rased to the ground by the Chinese. All possible obstacles were opposed to Portuguese commerce, and finally only the port of Macao was left open to them. There, however, they have remained down to our own time.

Japan was reached by the Portuguese in 1542, under conditions which have not been fully cleared up; on the one hand it is said that Antonio de Mota, Francisco Zeymoto, and Antonio Peixoto were stormdriven to the Isle of Nipongi during a voyage to China; on the other hand, whether rightly or wrongly, the free-booter and adventurer Fernam Mendez Pinto lays claims to this discovery. Not that it could be called a new discovery, since the country was already known to Europeans through Marco Polo. Reliable accounts of Japan and China were first obtained through missionaries,



64. [GONSALEZ DI MENDOZZA], *Il gran regno della China*, Bologna 1589. (Original size 0.277 x 0.193 m.)

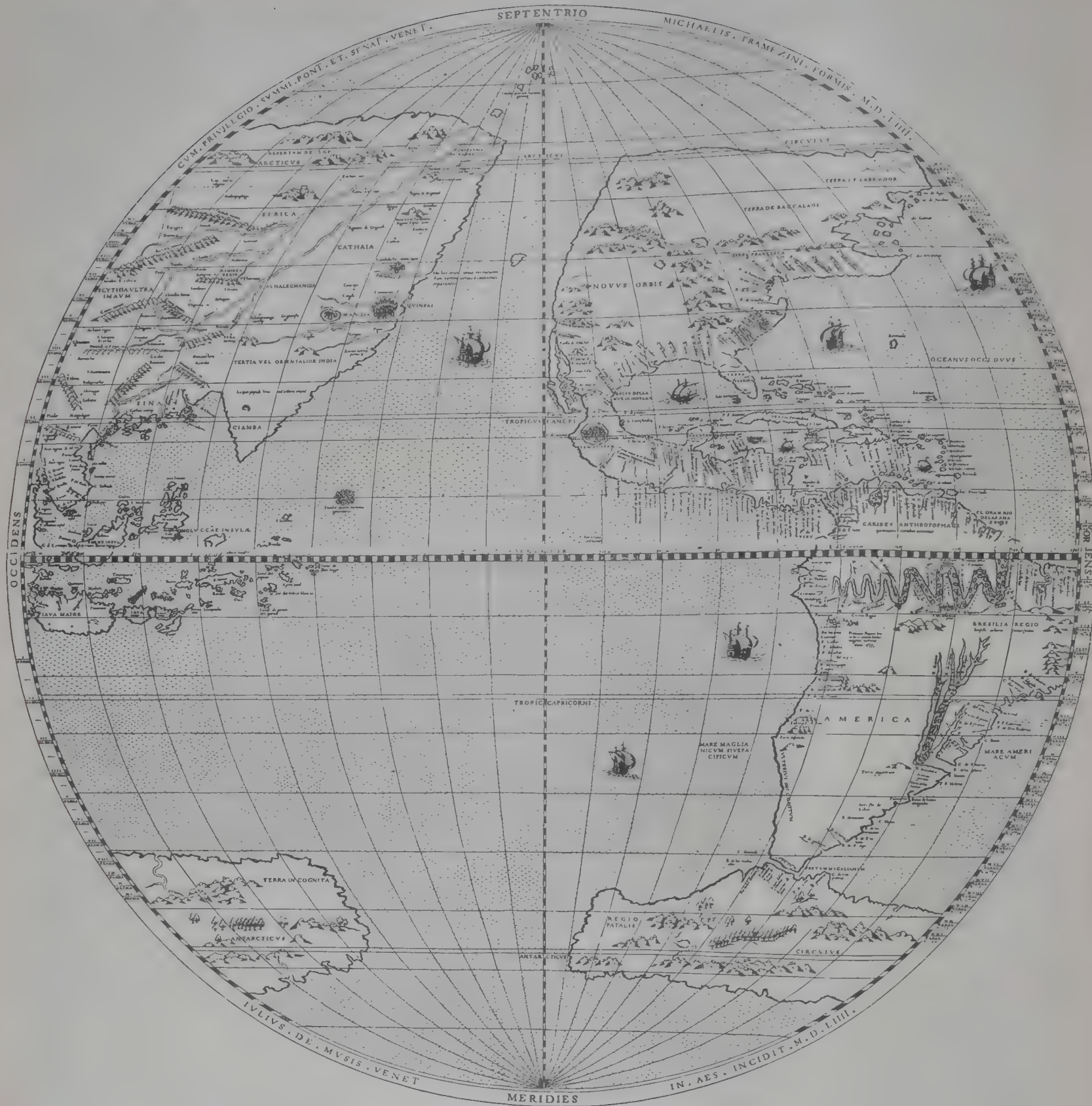
A new trading expedition was sent in 1516 under Fernão Perez d'Andrade. His own ship, however, only got as far as the mouth of the Mekong River, whence he returned to Malacca. But one of his vessels, under Duarte Coelho, reached the mouth of the river Menam in Siam, where she stayed during the season unfavourable to navigation, proceeding to her destination later. Andrade too started again for China in July, 1517, and came safely to Canton.

In the beginning the relations between the Europeans and the authorities of the great empire were friendly, but quarrels soon arose, besides which complaints were received from Malayan chiefs who had been robbed and insulted by the Portuguese. After various negotiations, the ruler of China declared that he could not tolerate in his dominions this "turbulent, quarrelsome, and greedy" people. Two trading-

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who for some time worked with great success in these countries, under Francisco Xavier in Japan from 1549, and Matteo Ricci in China from 1583. The holy fathers were not, however, very eminent cartographers. As an example, a map of the Celestial Empire published by them in the year 1589 is here given (fig. 64).

The foregoing is not meant as a history of the Portuguese discoveries and conquests in Asia; for such does not lie within the scope of a work like this. It is only to facilitate a correct understanding of the history of cartography, that I have described the course of the wave of geographical discovery from the Cape of Good Hope along the east coast of Africa to Melinda and Calicut; thence to Ceylon, the Sunda Islands, and Malacca; to Socotra and Ormuz, and from these places to the interior of the Red



65. Map of the world, 1554. Western hemisphere. (Original diameter 0.745 m.)

Sea and the Persian Gulf; from Malacca to the Moluccas, China, and Japan. Naturally this only alludes to European voyages of discovery to the countries of south and east Asia. These lands were early very populous, and long before we had any knowledge of them, a brisk trade by sea as well as by land was carried on between them. MARCO POLO, book III, chapter 14 (Yule's edition), even tells us that he had seen charts in the possession of native skippers in Ceylon.

In chapter XXI of GASPAR CORREA'S *Lendas da India* it is said that the commanders of Vasco da Gama's vessels, on their return voyage from India (1499), ordered the navigators to keep a good look-out in Melinda, carefully to note the character of the coast and the landmarks on it, to ask the Moorish pilots about everything that they saw and to write down the answers in full, to put down the

names of rivers, towns, and anything of mark. Similar notes were also taken down, on his own account, by the ship's chaplain Joan Figueira, who when severely ill in Melinda presented his diary to Gama. The latter was very pleased with the gift and ordered Figueira, after he had recovered, to continue his notes to the end of the journey. Many copies of this log-book were subsequently made. A very worn and badly used one was seen by Correa in the possession of Albuquerque. Such logs evidently were kept on most Portuguese expeditions that touched at new countries not mapped before. The oldest original Portuguese maps of the Indian Ocean, long kept secret and subsequently lost, were at first based on notes of this kind, but also in many cases directly on the information and maps of Moorish pilots, who are often referred to in a manner which shows that the



66. Map of the world, 1554. Eastern hemisphere. (Original diameter 0.745 m.)

seamanship of the Egypto-arabian skippers had reached a level not far below that of the Europeans. The seamanship of the latter, however, during the 16th century was making rapid progress, while that of the Moors as well as that of the Chinese remained stationary on the same level as it had reached centuries before.

As regards the charts and instruments used by the Moorish navigators, the following information is given in Barros' *Asia*, decade I, book IV, chapter 6: "Among the men who came to visit the ships [in Melinda] was a Moor of Guzarát, by name Malemo Cana, who accepted the offer to accompany them to India. Vasco da Gama was pleased with his knowledge, especially after he had shown him a chart on which the whole Indian stretch of coast was mapped in the Moorish fashion, *i. e.* with meridians and parallels

drawn closely together but without other rhumb-lines . . . When Vasco da Gama showed him the large wooden astrolabes and other instruments of metal, which had been brought to take the altitude of the sun, the Moor was not in the least astonished, but said that pilots in the Red Sea used triangular brass instruments and quadrants, with which they took altitudes, especially of the star most used in their navigation. The Moorish pilot himself, as the sailors of Cambaia and India, sailed guided by certain stars, some of which were in the north or south, others moving in the middle of the heaven in the east and west. He did not take altitudes with instruments like those that Gama showed, but with another, which was shown by the pilot . . . and which resembled the one we now [at the time of Barros?] use, and which is called Ballestrina (cross-staff or Jacob's staff) by the sailors."

The Arabs used quadrants for the determination of altitudes, and were on the whole little inferior to the Portuguese in navigation. The Arabian compass is described by OSORIUS (book I, folio 25 verso, Ed. Coloniae Agrippinae 1575) not as a magnetic needle but as a disc movable round a point.¹

Unfortunately the original charts and sailing-directions of the Portuguese of the three first decades of the 16th century are lost. On the other hand there are extant many such works by Dom João de Castro, the 13th governor and the 4th viceroy of India, viz:

1) *Roteiro de Lisboa a Goa* por D. JOÃO DE CASTRO (1538), published in Lisbon in 1882 by JOÃO DE ANDRADE CORVO, after two MSS. preserved in the Public Library of Evora.

2) *Primeira Roteiro da Costa da Índia desde Goa até Dio narrando a viagem que fez O Vice-Rei D. Garcia de Noronha* . . . 1538—1539. Por Dom JOÃO DE CASTRO . . . *Secundo MS. Authographo. Publicado par Diogo KÖPKE*, Porto 1843 (with 15 maps of ports, here reproduced on pl. XLI). The original MS. belonged in 1843 to the library of Count da Barca.

3) *Roteiro em que se contem a viagem que fizeram os portugueses no anno de 1541, partindo da nobre cidade de Goa atee Soez* . . . por Dom IOAM DE CASTRO . . . *Tirado a luz pela primeira vez do manuscrito original . . . pelo doutor ANTONIO NUNES DE CARVALHO*, Paris 1833 (with 16 maps of ports, here reproduced on pl. XLII). To the complete work in Portuguese is appended an abbreviated Latin revision of the end of the 16th century, under the title: *Itinerarium Maris Rubri, seu Sinus Arabici, auctore D. IOANNE DE CASTRO*.

The original of the roteiro published by Carvalho is kept in the British Museum (Bibliotheca Cottoniana). It was damaged in the fire which destroyed part of the Cotton library on the 23rd of October, 1731. Portions of the 16 maps² contained in the work were thus burnt away, as is seen on the reproductions here given. It is said to have belonged originally to Sir Walter Raleigh, who had bought it for £ 60, and had had it translated into English. It was subsequently printed in an abbreviated form by PURCHAS in 1625, and translated from the English into Latin and printed by ANTONIO MATHEUS (*Veteris aevi analecta*, ed. 2:a, II, Hagae Comitum 1738, pp. 215—251), and into French by PREVOST in his *Histoire générale de voyages*, I, Paris 1746, pp. 169 *et. seq.*

João de Castro was born in 1500, and died as the fourth viceroy of India in 1548. He was one of the bravest heroes and one of the many distinguished generals and statesmen, which the Indian history of Portugal, so rich in great deeds, has to show. In this field, however, he had his equals and perhaps his superiors. As navigator, hydrographer, and observer, on the other hand, he remained unsurpassed up to the time of Barents, Linschoten, Hudson, and Davis. De Castro's roteiros contain minute descriptions of harbours, accompanied by maps, statements concerning landmarks, the depths of the fairways, the condition of the anchorages, distances, tides etc. Pupil of the celebrated mathematician Pedro Nuñez, so far as the instruments at his disposal permitted he made correct determinations of latitudes. He cal-

culated the declination of the compass with the aid of corresponding altitudes of the sun. He quotes all the original observations on which each determination is based — unmistakable evidence of his correct conception of the true nature and essence of precise determination. The following instance may here be quoted:

Latitude-determinations by de Castro.

De Castro.	A modern map. ³
N. Coast of Çacotora 12° 45'	Socotra 12° 40'
Aden ⁴ 12° 35'	Aden 12° 46'
Portas do Streito 12° 15'	Babel Mandeb (the middle of the sound) 12° 35'
The isle at Maçua 15° 30'	Massova I. 15° 36'
Çuaquem 19° 17'	Sawakin 19° 6'
Porto de Dradate 19° 48'	Mersa Sheikh Barud(?) 19° 35'
Bahia de Fuxa 20° 13'	Mersa Fejer 20° 0'
Arequea 20° 32'	Mersa Arrakiyah 20° 12'
Rio de Farate 21° 45'	Farat 21° 31'
Porto de Igidid 22°	Ras Iazriyal(?) 22° 16'
Raselenaxef 24°	Ras Benàs 23° 56'
Porto de Tuna 25° 33'	Mersa Shuna 25° 28'
Alcocer 26° 11'	Kosair 26° 7'
Ilha Suffange el Bahar 26° 57'	Safajali I. 26° 45'
Toro 28° 15'	Tor on the Sinai peninsula 28° 13'
Soez 29° 45'	Suez 29° 58'

In comparing the determinations of Castro with those of the present time, it should be remembered that the points of observation can hardly be identified within less than 10' to 15'. The errors of observation seldom exceed 10'.

Similar roteiros, though often compiled with less insight, were also probably drawn up for the Asian coast-countries situated beyond Cape Comorin. None such, however, are supposed to be extant from the first half of the 16th century. In these regions, moreover, the expeditions of private freebooters seem to have played a more important part than in the western waters. In Austral-Asia the charting of the complicated archipelago evidently presented too great difficulties to the hydrographers of the time, since they knew of no way to make exact longitude-determinations, and therefore found it difficult to obtain fixed points for their charts. There were therefore for centuries no determinations of distance that were reliable. Fairly correct maps of the Sunda Islands, the Moluccas, etc., are first met with after the navigators of Holland and England had broken the monopoly of trade in these parts to which the Portuguese and the Spaniards considered themselves entitled.

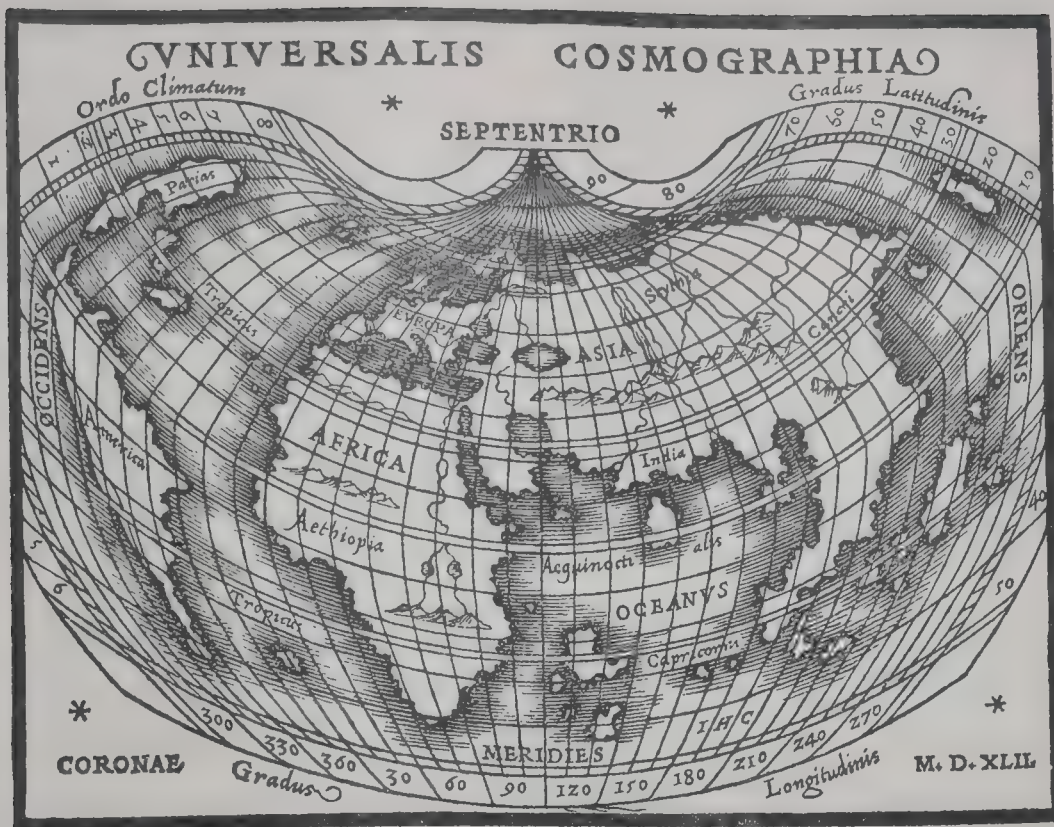
How the knowledge of the coasts of Asia gradually developed, is shown by the following list of the old hand-drawn and printed maps of these parts which are extant at the present day. The greater number of them are reproduced either in the Facsimile-atlas or in the present work. Several, however, I have not had the opportunity of seeing either in the original or in reproductions; but I hope that this unavoidable omission will have no disturbing influence on the general outlines of the picture of cartographic history here set forth.

¹ OSORIUS here describes an Arabian compass-rose as an improvement on the ordinary compass, and as unknown to Gama in 1498 ("Deinde cum facillimum sit, humanis ingenii addere semper aliquid ad ea, quae sunt solerter inventa, aliam normam rationem excogitarunt, qua possent exactius, quem cursum in navigando tenerent, ratione perspicere.") This seems to confirm my previous statement, that the compass-rose was not generally known among European sailors till the end of the 15th century.

² One of these maps is missing in the Cotton MS. This, however, was found in a portfolio, containing MSS. about the Orient, acquired by d'Anville in 1726 from Melchisédec Thevenot, "que l'on sait avoir été fort appliqué à de pareilles recherches". (D'ANVILLE: *Mémoires sur l'Égypte ancienne et moderne*, Paris 1766, p. XI.)

³ Names as well as latitudes are extracted from the English Admiralty chart of 1884. I have excluded the following determinations, since De Castro's names cannot be identified with any modern ones: Porto de Çomol 22° 30', Porto de Gadenauhi 24° 45', Xuduam 27° 45'.

⁴ According to a Latin inscription on the map.



67. Map of the world by HONTER, 1542. (Original size.)

The Cartography of Asia from 1492 to 1561.

The following are the most important globes and maps* of the south and east littorals of Asia, published between 1492, when Martin Behaim's globe was completed, and 1561, when Gastaldi's three maps of Asia were issued.

1. 1492. FA, fig. 40.² BEHAIM'S globe, often reproduced but generally most unsatisfactorily. *Vide* p. 128.
2. (1492.) N. fig. 54. Map of the world by MARTELLUS GERMANUS. *Vide* p. 128.
3. (1495.) FA, fig. 41. *The globe of Laon*. *Vide* p. 128.
4. 1500. N. pl. XLIII, XLIV. Cosa's map of the world drawn on parchment and signed: "Juan de la cosa la fizo en el puerto de S. mja en año de 1500." This map was picked up in 1832 in Paris at an old curiosity shop by Baron Walckenaer, and after his demise bought by the Spanish Government for 4020 francs. It is now deposited in Madrid. The draughtsman of the map, Juan de la Cosa, was master of Columbus' flag-ship, the *Santa Maria*, on her first voyage and was also the owner of the vessel. On his second voyage he accompanied Columbus as cartographer. On June 12th, 1494, together with the other members of the expedition he swore to the possibility of passing by land from Cuba to China, an oath which he afterwards retracted; he settled in the New World and there died, 1510, in Cartagena from a wound caused by an Indian arrow that was poisoned (HARRISSE, *Disc. of N. Am.*, p. 711). The map is therefore drawn by a prominent sharer in the early voyages of Columbus, and one who was a clever cartographer in his day. That part of the map embracing Asia is however drawn with but little knowledge of the Portuguese discoveries. The land between the Indus and the Ganges forms a straight continuous littoral, without any projection corresponding to the Indian peninsula. At the mouth of the Indus may be read: "Tierra descubierta por el Rey don manuel Rey de Portugal." A large triangular island, placed to the south of this coast is named Taprobana. The Caspian sea has four names: Mar de sara, Mar caspiu, Mar ymanu and Mar de bacu, while south of it there is a star, followed by the three wise men of the East on horseback. On this map Cosa draws Cuba as an island, and the mainland at the isthmus of Darien he obviously considered the east coast of

Asia. Cosa's map of the North of Europe is very peculiar. The Baltic and the Scandinavian peninsula are here of the same shape as in Andrea Bianco's portolano of 1436 and provided with a number of legends. Of these, however, with the exception of the distorted names of Denmark, Norway, Gotland and Esthonia, no single one can be identified with names known in the North. The names must be pure fantasy, simply written to fill a blank space on the map. Doubtless many names in Cosa's map of the New World have a similar origin. Names newly created seem here to be written on the blanks of the map to a far greater extent than the right of discovery would permit. The map has been critically examined by HUMBOLDT, KOHL, MAJOR, WINSOR, HARRISSE and others, references to whom are given in JUSTIN WINSOR'S *History of America*, II, London 1886, p. 106 and HARRISSE'S *Disc. of N. Am.*, p. 412. MAJOR supposes, though without due foundation, that the man drawn in the left hand corner of the map, carrying the Child-Christ to land, is a portrait of Columbus.

5. (1502.) N. pl. XLV. Portuguese map of the world in the possession of Mr HAMY (*The King chart*, HARRISSE). *Vide* p. 128. Drawn after the first voyage of Vasco da Gama. Besides "Colochuti" (Calicut) we here find Ormuz, Malacca, and Madagascar. The promontory of Asia between the Indus and the Ganges is divided into two by a broad bay which is partly occupied by a very large island, Taprobana. The names occurring on this island are still mostly Ptolemaic. The mainland of Asia is completely finished off towards the north and east, without any connection with the New World.

6. 1502. CANTINO'S map of the world. A large planisphere, drawn on parchment in gold and colours (2,200 X 1,005 m.) and signed: "Carta da nauigiar per le isole nouamte tr[u]ate in le parte de l'India: dono Alberto Cantino al S. Duca Hercole." Cantino was an ambassador from Hercules d'Este, duke of Ferrara, to the King of Portugal. From a letter of Cantino, dated Rome Nov. 19th, 1502, we learn that the map cost 12 ducats. In *The discovery of North America*, p. 422-25, HARRISSE relates the vicissitudes of this important document. It was at first kept in the d'Estes Archives in Ferrara, then was taken to Modena, where it was pasted on

* Space does not permit of the insertion of maps embracing greater or lesser parts of Asia, drawn previous to 1492, or copies of them made later. They consist of:

A. Twelve special maps of Asiatic countries and a map of the world in Ptolemy's geography. Many hand-drawn copies from XIII to XV centuries are still extant of these maps, and are published in numerous printed editions of Ptolemy from the XV and XVI centuries. The maps of the edition Romae 1490 (1478) are reproduced in the Facsimile-atlas, pl. I and XVI-XXVII. As regards the number of the maps, this is the most comprehensive atlas of Asia until the later editions of Mercator's Atlas.

B. Tabula Peutingeriana.

C. Maps of the Macrobius-type, or other wheel maps of the Middle Ages. Many of these are reproduced in the Facsimile-atlas, and in this work, as also by Santarem, Jomard, Lelewel, Kretschmer, Konrad Miller, together with learned and valuable monographs on the maps reproduced.

D. Arabian maps, all very incomplete from a cartographical point of view, with the sole exception of Edrisi's map of the world.

E. Maps of the world of the same type as C. but richer in details, partly founded on actual observations made during XIII, XIV and XV centuries. To this group belong the Borgia map of the world, Fra Mauro's and Leardo's planispheres, and others.

From this list moreover have been omitted portolan-maps only embracing the Mediterranean and Black Sea with Syria and Asia Minor; as also printed maps of these countries derived from portolanos (e. g. some of the Asiatic maps in Ptolemy 1513); and finally maps of the world of the same type as Ptolemy's, but introduced into other works, e. g. the map of the world in the different editions of Schedel's *Liber Cronicarum* 1493-1500 (*vide* FA, p. 38).

* FA = Nordenskiöld's Facsimile-atlas. N. pl. and N. fig. relate to reproductions in the present work. Those dates that are printed in brackets denote the supposed year when the undated maps were drawn or printed.

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a screen. Finally it fell into the hands of a porkbutcher where it was discovered by Signor Boni, who took charge of the ill-treated and some- what tattered map and deposited it at the Biblioteca Estense. Harrisse has reproduced, as a separate print of full size, that part embracing the New World and, moreover, in the above-mentioned work (pl. VI and VIII) gives reproductions on a reduced scale of the New World and the south coast of Asia. This reproduction shows that Cantino knew more of the Portuguese voyages of discovery than most other map-designers of the first half of the sixteenth century.

7. (1502.) CANERIO's map of the world. This important map was discovered some years ago in "Les archives du service hydrographique de la marine" of Paris by L. GALLOIS and described in a special paper, *Une nouvelle carte marine du XVI^e siècle, le portulan de Nicolas de Canerio* (*Bull. de la Soc. de géogr.*, Lyon 1890). In this Gallois gives an imperfect representation of the map. Later on a part of it was reproduced in photogravure by G. MARCEL: *Reproductions de cartes et de globes, relatives à la découverte de l'Amérique*, Paris 1893. It is of large size (2.25×1.75 m.), cleverly drawn on parchment in usual portolano style, undated but signed: "Opus Nicolay de Canerio Januensis." On the left side the degrees of latitude are given, but there are no degrees of longitude. As no hint is given of discoveries made after 1502, Gallois ascribes the map, or the Portuguese original which may have been copied, to that year. Canerio's and Cantino's map of the world and Hamy's portolano are the first one provided with a system of wind-roses (*Cf. supra* page 48).

8. (1503). "KUNSTMANN No 3." A Portuguese-Catalan map of the world at the Royal Library at Munich. The American part is reproduced by FR. KUNSTMANN, KARL V. SPRUNER, and GEORG M. THOMAS in *Atlas zur Entdeckungsgeschichte Amerikas*, München 1859, pl. III. Of the eastern half I have not seen any reproduction. The mapping of Greenland seems to be founded on independent observation. A promontory on the south-eastern coast of Greenland, almost corresponding to the Ice Cape of the Scandio-Byzantine maps, is marked with the name, so significant for a steep glacier cape projecting out into the sea, "C. de mirame et l'exame", which according to HARRISSE may be rendered, "Cape look-at-me, and avoid-me". The map has been examined by KUNSTMANN, PESCHEL, KOHL and others. As regards references to their works, I must refer the reader to HARRISSE, *Disc. of N. Am.*, p. 425.

9. (1503.) KUNSTMANN No. 17. Map of the world, preserved in the Munich Library. The American part is represented in pl. II of KUNSTMANN'S Atlas, and was first described by J. A. SCHMELLER: *Über einige ältere handschriftliche Seekarten (Abhandl. der Akad. der Wissenschaften, IV Bd., Abth. I, München 1844, p. 252)*, afterwards by KUNSTMANN, KRETSCHMER, HARRISSE (above-cited work p. 426). I have not seen any description or reproduction of the eastern half of the map.

10. 1503. FA, pl. XXXI. Map of the world in REISCH's *Margarita philosophica*, Friburgi 1503. This map agrees in the main with Ptolemy's map of the world. Only an inscription on the land limiting the Indian Ocean in the South indicates that a rumour of the discoveries made by the Portuguese has reached the author, Gregorius Reisch, or the publisher, Johannes Schottus. A proof that they did not dare to place credence in what report declared is shown by their retaining the Ptolemaic drawing of the map and by the cautious wording of the inscription. This same map is sometimes included in REISCH's *Margarita*, Argentorati 1512.

11. 1508. FA, pl. XXXII. Ruysch's *Universalior cogniti orbis tabula ex recentibus confecta observationibus*. Engraved on copper for the edition of Ptolemy, Romae 1508; often inserted in edition of 1507. This map of the world is of importance for the cartography of Asia. In addition to what has been stated in FA (pp. 63-67) we find that the Portuguese discoveries up to 1507 have been recorded, and even "Malacha" is there marked which was not visited by a vessel of the royal navy of Portugal until 1511. The name moreover is also to be found in Hamy's portolano, which is supposed to have been drawn in 1502. An island, placed where Ceylon lies, is called "Prilam"; another, west of the East Indian peninsula, "Taprobana alias Zolion". About the same position as Madagascar there is a large island, Camarocada. In more ways than one this map forms an epoch in the history of cartography. It would be very interesting to get some biographical data concerning the author of this remarkable work. Thomassy's supposition, approved by HARRISSE (*Cabot*, p. 164), that Ruysch was only the engraver, and Marcus Beneventanus the author of this map, is certainly incorrect. All the maps of learned professionals during the first part of the XVI century were schematic representations of the world, founded on Ptolemaic erudition and profound speculations, but with little regard to actual observations.

Ruysch's map bears a very different character. Those new observations which had come to his knowledge are embodied without any attempt to shape them into classic form.

12. 1509. The map in the Paris edition of *Cosmographia Pii Papae in Asiae et Europae eleganti descriptione*, per Henricum Stephanum, Parisiensis . . . MDIX. This map is a badly executed copy, but slightly altered, of the map in Reisch's *Margarita* 1503. As regards Aeneas Sylvius' very curious introduction to the description of Asia, as also for bibliographical data concerning this work, I must refer the reader to FA, p. 41. The map is probably engraved by the first Imprimeur royal in France, Geoffroy Tory, who has signed the dedication and introduction in this edition of the celebrated geographical works of Aeneas Sylvius.

13. 1509. FA, fig. 22. A drawing of the old hemisphere on the title-page of *Globus mundi, declaratio sive descriptio mundi* etc., Argentorati 1509.

14. (1510.) FA, fig. 43. The LENOX globe. A globe engraved on copper only 0.127 m. in diameter. Found in Paris 1855 and now included in the Lenox Collection in New York. Reproduced and described by B. F. DE COSTA and G. GRAVIER as also in FA. Probably this is the first globe on which the New World is depicted. For I consider that this little globe is older than the globe-prints which I place as Nos. 15 and 23. South America has been given a pretty correct form; the north part of the new continent however is wanting, or more correctly speaking is replaced by some large islands: Spagnolla, Isabel and Zipancri. The map of Asia has the same form which it retained on a number of maps of the XVI century, i. e. that part of the world is not joined to America. Nor is it connected with South Africa by any unknown land bounding the Indian Ocean on the south. The enormous extension of the East Indian peninsula to the south-west, and a number of large islands in utter confusion on the globe in the southern part of the Indian Ocean, prove that in this respect they did not dare to deviate too much from Ptolemy. Moreover the south coast of Asia is drawn in Ptolemaic manner. Only in the neighbourhood of the Indus is there one name, Calicut, reminding of the voyages of the Portuguese.²

15. (1510.) globe-print in gores in General von HAUSLAB's, afterwards Prince LICHTENSTEIN's, collection in Vienna (0.38 X 0.28 m.). This print has been ascribed to Waldseemüller and been considered to be connected with the anonymous pamphlet: *Globus mundi, declaratio sive descriptio mundi et totius orbis terrarum globulo rotundo comparati ut spera solida. Qua cuiusvis etiam mediocriter docto ad oculum videre licet antipodes esse, quorum pedes nostris oppositi sunt*, Argentorati, Grüninger 1509. On this clumsy wood-cut the south part of the New World is designated by the name of *America*, while the north part forms a large island by itself, on the west coast of which the island Zipangri is depicted. Reproduced by L. GALLOIS (*Les géographes allemands de la renaissance*, Paris 1890).

16. 1511—1549. VESCONTE MAIOLO's maps of 1511, 1519, 1527 and 1549; JACOBUS MAIOLO's of 1561. (*Cf. supra* p. 64.)

If we consider Canerio's and Cantino's maps, that of Hamy, and Kunstmann Nos. 2 and 3 more as charts in portolano style rather than real portolanos, then Vesconte Maiolo was the first to publish maps of the New World in the same style as ordinary portolanos. In this respect he was a forerunner of Battista Agnese and vied with him in respect to the ornamental execution of the work. What its geographical value may have been I cannot determine owing to the want of *complete* reproductions. Pl. V of KUNSTMANN is a fine reproduction of the map of the New World in Maiolo's Atlas of 1519, which is signed: "Vesconte de Maiollo civis Janue composuy hanc cartam in Janua de anno Domini 1519." The original is in the Royal Library at Munich. The map of 1527 is a planisphere on two leaves of parchment, together 1.70×0.60 m., signed: "Vesconte de Maiollo composuy hanc cartam in Janua anno dni 1527 die XX Decenbris." At present the date on the map reads 1587, but as DESIMONT notes, this has arisen from a falsifying of dates quite usual with portolanos. The American part of the map, which has been reproduced by HARRISSE (*Disc. of N. Am.* p. 217) and by KRETSCHMER, is of importance as representing a new type of map for the northern part of America, here called *Francesca*, which type first appeared after the return of Verrazano. The isthmus of Panama is divided by a narrow strait, "streito dubitoso". A map of this type was plainly the source of Münster's delineation of America (FA, fig. 73) and of Georg Hartmann's(?) globe of about 1540 (FA, pl. XL). The original is in the Ambrosiana at Milan.

17. 1511. FA, pl. XXXIII, pp. 18 and 68. BERNARDUS SYLVANUS: *De universalis habitabilis figura cum additionibus locorum nuper inventorum*. A large map of the world included in his edition of PROLEMY, Venetiis 1511. The map of southern Asia has scarcely been affected by the

² Small printed globes and maps on Glareanus' projection seem to have been obtainable in Germany from the commencement of the sixteenth century. This is proved by a letter from the Benedictine abbot Tritemius to Vilhelmus Veldicus Monapius, dated Aug. 12th 1507, cited by FIORINI, *Le sfere cosmografiche* etc. (*Boll. d. Soc. Geogr. Ital.* 1894, p. 123) after *Joannis Tritemii Abbatis Spanhemensis epistolarum familiarium libri duo* Hagenae 1516 p. 294.

Such small globes and map-prints in gores were probably widely spread at the beginning of the sixteenth century. The previously heretical doctrine of the spherical form of the world began then to be generally accepted, chiefly in the country of the approaching reformation. Most of the globes of this period were made in Germany, and their study seems to have been embraced there with great interest. The globes themselves have long ago found their way to the dust-heaps, when, blackened with age and dirt, they were no longer ornamental, but the prints thereof have now again escaped destruction. We may, however, take it for granted that only a few of the globe-prints from the commencement of the sixteenth century are now extant, and that most of these prints do not emanate from more or less learned cosmographers but from professional wood-engravers. They have used for their work the model that happened to be at hand, if only it was in favour with the public. To ascribe unsigned globes to celebrated cosmographers depends therefore on a mistaken idea as regards the nature of these prints. It would be more correct to ascribe them to well known xylographers. Thus the celebrated mathematician Schöner probably had nothing to do with most of the unsigned globe-prints which are to be found in numerous pamphlets and learned dissertations.

As to the determination from geographical data of the date of undated globes, this is of value only for the downward limitation of the age of the print. Inclined as the fabricants were to keep to old and well-known patterns, and owing to the difficulties encountered in the commencement of the sixteenth century by the publishers in all branches of science to obtain new and original works that were worth printing, and considering with what slow degrees the knowledge of the new geographical discoveries then spread among the general public, it was not the exception but the rule, that a globe designed for the general public was printed a decade after the last discoveries entered on its map.

discoveries of the Portuguese except in so far as that the land limiting the Indian Ocean in the South has been removed. On the south coast of Asia there is no name borrowed from the discoveries of the Portuguese. Madagascar appears to be represented by three islands: "Menutias ins.", "Comorbina in." and "Madax".

18. After 1511. A map of the world engraved in metal on the lid of a beautifully worked casket, described and copied in FRANCESCINI's *Illustrazione di un' Urnetta lavorata d'oro e di varj altri metalli all' agemina coll' iscrizione Paulus Agemini faciebat*, Venetia s. a. (1800). Reproduced also by JOMARD. The map, from an artistic point of view a very fine piece of workmanship, is a perfect copy of Sylvanus' map of 1511, and must have been engraved shortly after this date. From a geographical point of view it is only interesting as being the first piece of goldsmith's work known to have had the New World engraved thereon.

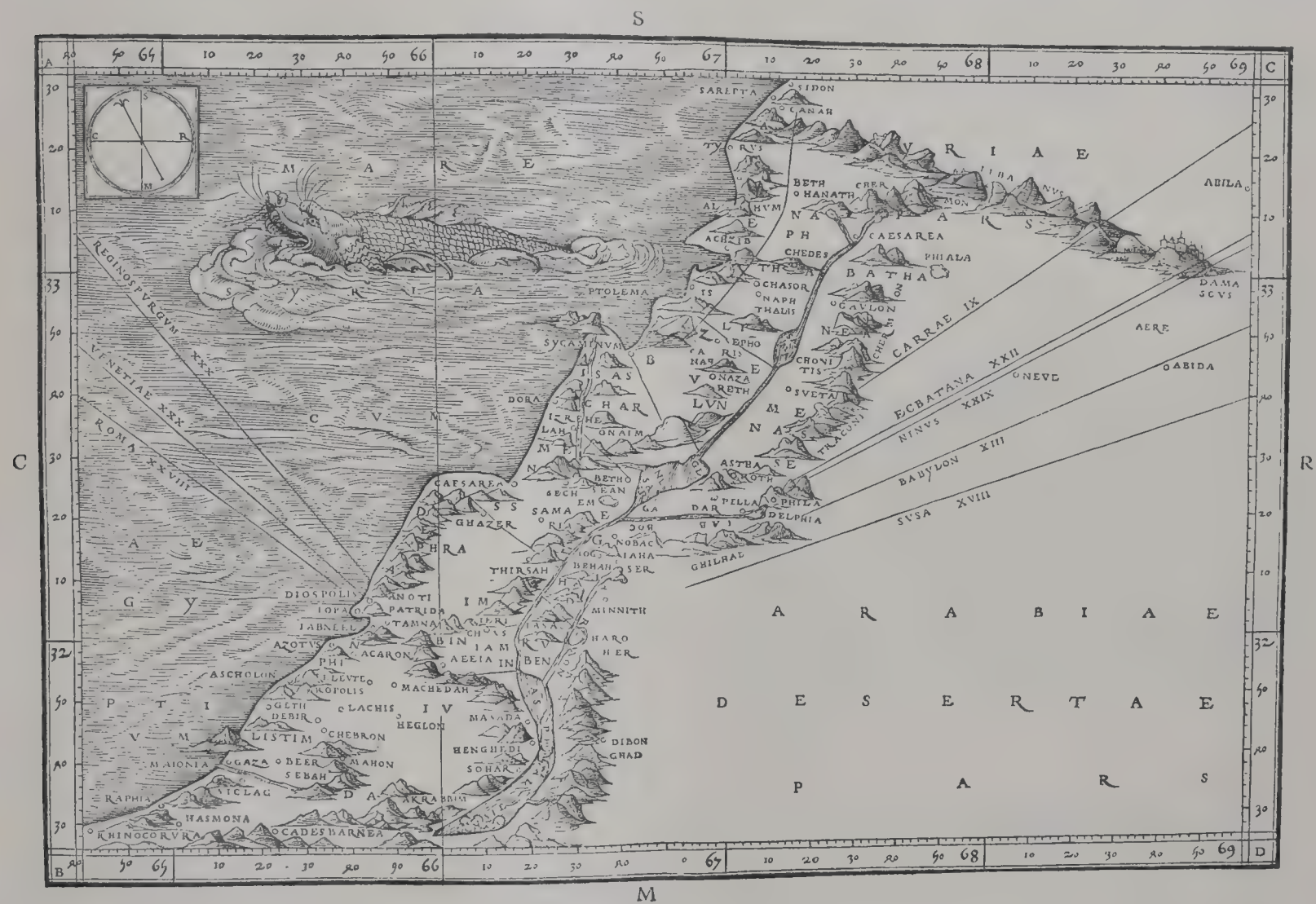
19. After 1511. An anonymous map of the Indian Ocean, deposited in Munich, (1.30 x 0.69 m.) on which the Moluccas are said to be entered. The map is supposed to have been made after 1511 and probably before 1513. I have seen no reproduction or close analysis thereof. Perhaps there is some error as regards the determination of the date (HARRISSE, *Disc. of N. Am.*, p. 471.)

20. 1512. FA, pl. XXXI, pp. 42 and 68. An insignificant map of the old hemisphere, inserted in *Meteorologia Aristotelis, eleganti Iacobi Fabri Stapulensis Paraphrasi explanata, commentarioque Ioannis Coclaei Norici declarata* etc., Norinbergae 1512.

on direct information from Portugal. The maps introduced here, as also those previously cited concerning Africa, all bear witness to this fact. India, as in Ruysch's map, forms a peninsula projecting from the continent, and on its coasts occur the names *Andegiba*, *Callicut*, *Cananor*, *Cochim*, well-known from Gama's first voyage. Moreover on the East Indian peninsula the name *Mallagua* is to be read. But the Australasian islands and the land east of Malacca were evidently unknown to the maker of the map. The contours of the great Indian peninsula of Asia are here represented far better than in many maps from the middle of the sixteenth century.

23. (1514.) FA, pl. XXXVII, p. 76. LUDOVICUS BOULENGER. On this globe Calicut is mentioned. Otherwise the map of the eastern and southern parts of Asia is drawn in about the same way as in Stobnicza's map. The Pacific on the west coast of America is named "Oceanus occidentalis" and on the east coast of Asia "Oceanus orientalis". HARRISSE ascribes this globe to 1518.

24. (1515.) FA, pl. XXXVII. A globe-print in gores engraved on wood, in my collection, afterwards also discovered in the Hauslab-Lichtenstein collection, and in the Bibl. nationale in Paris. Calicut is noted, and at the south eastern corner of the East Indian Peninsula there is a large island "Seijlam". This globe-print HARRISSE ascribes to 1518 owing to the inscription: "Insula in qua reperitur lignum guaiacum." The guaiac-tree is first mentioned in print in an anonymous pamphlet of the same year. As Ingolstadt and St. Jago (S. Jacobus) are the only



68. Palestine. From ZIEGLER's *Quae intus continentur* etc., Argentorati 1532. (Original size 0.345 x 0.855 m.)

21. 1512. FA, pl. XXXIV and p. 68. STOBNICZA's map of the world. This map, very original as to the drawing of the New World, is as regards the South and East of Asia, entirely based on Marco Polo. Not a single legend hints at any knowledge of the Portuguese discoveries. Japan, "Zipangu", forms an enormous island in the centre of the Pacific; "Madagascar" and "Zinzabar" large islands in the Indian Ocean. On the former the bird "Rock" is drawn. It is uncertain, whether the map was originally made for Stobnicza's *Introductio in Ptholomei cosmographiam*. By researches in Stobnicza's own country I found in the Polish libraries 6 copies of this pamphlet, all without the map. Only two copies containing the map are extant, one in the Imperial Library of Vienna, the other in the Royal Library at Munich (compare EUGEN OBERHUMMER: *Zwei handschriftliche Karten des Glareanus in der Münchener Universitäts-Bibliothek; Jahresber. der Geogr. Gesellsch. in München für 1890 u. 91*, München 1892, p. 67). Besides the editions of 1512 and 1519 there is also an undated edition, which seems to be an earlier impression of the edition of 1512. Concerning Glareanus' manuscript copy(?) of Stobnicza's map vide No 34.

22. 1513. FA, pl. XXXV and fig. 10. *Orbis typus universalis juxta hydrographorum traditionem et Tabula moderna Indiae* from PROLEMY, Argentinae 1513. This edition of Ptolemaeus, which formed an epoch in the literature of cartography (FA, p. 19) is founded as regards the second volume of the work, *In Claudii Ptolemaei Supplementum* etc.,

towns in Europe named on the globe, Gallois and HARRISSE consider it to have been the work of Apianus of Ingolstadt. On comparing this globe-print with Apianus' map of 1520 (FA, pl. XXXVIII) it will be seen that an obvious resemblance exists as regards the contours of the land, more especially those of the New World. This seems to me to be a proof that the same original document was the basis of both these works. On the other hand the difference between the legends on the globe and on the map of 1520 witnesses against the supposition that Apianus also was the author of the globe-map. H. WAGNER and S. RUGE deem this globe-map to have been printed later than 1520.

25. 1515. FA, pl. XXXVIII. Map of the world in REISCH's *Margarita philosophica nova*. The names *Cananor*, *Callicut* and *Melacha* prove that the report of the Portuguese voyages of discovery had at last reached the publisher of this much used encyclopaedia. The Pacific is here called "Oceanus Indicus orientalis".

26. 1515. N. pl. XLVII. Circular map of the Old Hemisphere by JOHANNES STABIVS, engraved on wood by Albrecht Dürer. New prints of this wood-cut were published in (VON BARTSCH): *Sammlung verschiedener alter Holzschnitte, grösstentheils nach Albrecht Dürers Zeichnungen, wovon sich die Originalplatten auf der k. k. Hofbibliothek befinden*, Wien 1781, and were also specially taken when C. Ritter visited Vienna in 1847. Later on this map was reproduced on a reduced scale in *Monatsberichte*

über die Verhandl. der Gesellsch. für Erdkunde zu Berlin 1848. The map is of interest as regards the history of map-projections, but of little value in respect to geography. It proves that the Emperor Maximilian's "historicus" had no great knowledge of the important discoveries of the Spaniards. In CONRAD GESNER's *Bibliotheca* among the works of Stabius are reckoned: *Variae chartas chorographicas propria peregrinationis illustratione depictas, descriptio variorum modorum pingendi tabulas cosmographiae Ptolem. ex veris principiis artis picturae* (Compare FA, p. 88, foot-note).

27. (1515.) A hand-drawn globe of 0.240 m. diameter in Bibliothèque nationale in Paris. Compare MARCEL: *Un globe manuscrit de l'école de Schoener* (Bull. de géogr. hist. et descript., Paris 1889, p. 173). Its American part is reproduced by L. GALLOIS (*Les géographes allemands de la renaissance*, Paris 1890), and in MARCEL's *Reproductions de cartes et de globes*, Paris 1893. This globe, which is exceedingly interesting for the ancient cartography of America, is designated by HARRISSE (*Disc. of N. Am.*, p. 489) *The Paris Green Globe* owing to its colour.

28. (1515.) FA, figs. 46 and 47. Printed globe (s. l. e. a.), supposed to have been drawn by SCHÖNER. Two copies are still extant, one at the Military Library in Weimar, an other at the Library of Frankfurt am Main. The latter has been reproduced by JOMARD. The globe, of a diameter of 0.265 m., gives an idea of what were thought to be the boundaries of the continents just before Magellan sailed round the earth. The mainland of the New World forms two large islands, the north part "Paras" being separated by a strait from the south part "America" which has got a tolerably accurate form. It is divided in the South, just where the straits of Magellan really are, by a strait from a ring-shaped south polar continent, where at the place, corresponding to the north coast of Tierra del Fuego, "Brasilie regio" is inscribed. Two large lakes are marked here "Palus" and "Lacus Montaras". Southern Asia is drawn according to the Ptolemaic pattern modified by Marco Polo. For further particulars regarding this globe and its connection with some curious pamphlets printed about the same time I must refer the reader to Dr. FRANZ WIESER (*Magalhães-Strasse und Australkontinent auf den Globen des Johannes Schöner*, Innsbruck 1881, p. 19) and to the works of HUM-BOLDT, VARNHAGEN, KOHL, RUGE etc., cited by Wieser.



69. Map of the world from APIANUS' *Cosmography*, Amstelredam 1598. (Original size 0.123 x 0.085 m.)

This globe has given rise to several geographical pamphlets because:
1) It is considered, and apparently with good reason, to have been drawn before Magellan sailed round the world;

2) Notwithstanding this, a strait is found on the globe just where Magellan afterwards discovered the south-west passage from the Atlantic to the Pacific;

3) The globe, whether really by Schöner or no, is a graphic representation of the picture of the world in SCHÖNER's *Loculentissima quaedam terrae totius descriptio*; and

4) This work of Schöner is again partly a mere translation of the first printed "Zeitung" still extant: *Copia der Newen Zeitung aus Presillg Landt*. K. HAEBLER has recently found the German manuscript of this "Zeitung" in the Fugger Archives. This MS. proves that the letter treats of an expedition sent in 1514 by Don Nuño Manuel and Cristobal de Haro to explore the east coast of South America beyond the mouth of La Plata River (*Zeitschr. d. Gesellsch. f. Erdk. zu Berlin*, Bd. XXX, 1895, p. 352). The expedition probably reached to the entrance of the Magellan Straits. Judging from Stobnicza's map and from the inscriptions on the Australian continent of Vopel's globes, Don Nuño Manuel and Cristobal de Haro do not seem to have been the first European navigators that sailed in these seas. Similar bold, unlearned freebooters, pioneers, "forerunners", many a time utterly forgotten though sometimes specially favoured by fortune, meet us continually in the field of geographical discovery.

29. (1515.) A hand-drawn globe in HAUSLAB-LICHTENSTEIN's collection. Diameter 0.368 m. Similar to Schöner's globe of 1515, but without the south polar continent or Brasilie regio. First noticed by Varnhagen, described and partly reproduced by J. LUKSCH: *Zwei Denkmale alter Kartographie* (*Mittheil. der k. k. geogr. Gesellsch.*, XXIX, Wien 1886, p. 364) and by GALLOIS, *op. cit. supra* p. 80. Compare FA, p. 76 and HARRISSE: *Disc. of N. Am.*, p. 491.

30. (1519.) FA, fig. 45. DA VINCI's map of the world (not globe) drawn by hand on a peculiar projection. It was found among Leonardo da Vinci's papers and for that reason, though plainly without sufficient cause, ascribed to the great artist by MAJOR, who reproduced it in a monograph. If Major's idea of the date, 1514, be correct, this would be the first map of the world on which a south polar continent was marked and one of the first maps bearing the name of America. This name is here used to designate the southern half of the New World. The northern half is covered by the ocean, in which two large islands "Bacalar" and "Terra Florida" are placed. Asia is drawn in the Ptolemaic type modified according to Marco Polo, which so often occurs in the maps of the world of the early part of the sixteenth century. HARRISSE (*Disc. of N. Am.*, p. 504) considers that this map was drawn after 1519, the date of Da Vinci's decease, and that it is mostly based on a Spanish original, which was afterwards corrected by the aid of WALDSEEMÜLLER's *Cosmographie introductio*. As I have declared in FA the map cannot be an original work, but must be a copy of an older globe. The copy is obviously made by a person little versed in writing and perfectly ignorant of cartography, for instance a pupil at a drawing-school. As it was found among the papers of the great artist it was probably executed at his desire from an original (a globe) in the making of which he probably had no hand. That it is derived from Portuguese sources is shown by the drawing of India, which is far more correct than on the globes ascribed to Schöner. As regards this map and the literature respecting it, vide M. FIORINI: *Il mappamondo di Leonardo da Vinci ed altre consimili mappe* (*Rivista Geogr. Italiana*, Apr. 1894.)

31. 1520. A large globe drawn by hand by SCHÖNER, preserved in the German Museum, Nürnberg. Diameter 0.866 m. It has been the subject of extensive literature, regarding which I must refer the reader to the above-mentioned work by WIESER, FA, p. 80, and HARRISSE, *Disc. of N. Am.*, p. 506. This globe is mentioned in DOPPELMAYER's *Historische Nachricht von den Nürnbergischen Mathematicis und Künstlern*, Nürnberg 1730, p. 46. It is of great geographical interest, more particularly on account of the mapping of the south point of America, which, although the globe was made before the return of d'Elcano, is separated by a strait, corresponding to Magellan's Straits, from a large southern continent, Brasilia Inferior. Moreover it has this advantage over other globes ascribed to Schöner, that it is both signed and dated. I regret to say that the reproductions I have seen (those of Lelewel, Ghillany and Wieser) only embrace the New Hemisphere. On this part of the map, however, there projects a considerable portion of north-eastern Asia, separated by a broad arm of the ocean from those islands into which the north part of the New World is broken up. The island "Zipangri" (Japan) is placed so near Terra de Cuba in Oceanus Orientalis that it must be counted as belonging to the New World.

32. 1520. FA, pl. XXXVIII. *Typus orbis universalis juxta Ptolemei cosmographi traditionem et Americi Vespucii aliorumque lustrationes a Petro Apiano Leynico elucubratus An. Do. MDXX*. Probably first printed as a fly-sheet, afterwards included in CAMERS' edition of SOLINUS, Viennae 1520, and in POMPONII MELA, Basileae 1522. The print has been much sought after by collectors owing to the name America, which denotes the southern part of the New World. It is a badly executed wood-cut. The map itself is of little importance as regards geography, and can in no wise be compared to the map by Apianus, reproduced in this volume on pl. XLIV.

In respect to the mapping of Asia this map is almost entirely based on Ptolemy and Marco Polo. A distorted name alone (Callicut prov.) gives a hint that a faint, very faint rumour of the new and great discoveries in the south of Asia had reached the humanists of Ingolstadt. A detailed biography of Petrus Apianus and a bibliography of his geographical works will be found in the work by SIEGMUND GÜNTHER: *Peter und Philipp Apian, zwei deutsche Mathematiker u. Kartographen* (*Abhandl. der K. Böhm. Gesellsch. der Wissensch.*, VI. Folge, 11. Bd, Prag 1882). Compare FA, p. 99.

33. 1520. Two maps in PTOLEMY, Argentorati 1520. Printed from the same blocks as the Ptolemy maps of 1513. (FA, p. 20.)

34. (1520.) Two maps, signed *Glareanus*, drawn by hand on each side of a sheet of a paper which was bound up with the copy of WALDSEEMÜLLER's *Cosmographie introductio*, Deodate 1507, which belonged to Glareanus and is now at the University Library at Munich. They were discovered by Wieser and then described and imperfectly reproduced in the work by E. OBERHUMMER (*vide* No. 21). The one is a map of the new hemisphere, like the corresponding part of Stobnicza's map but not a direct copy thereof, as some investigators have supposed. This is plainly proved by a number of legends and islands occurring on Glareanus' map but not in the wood-cut attributed to Stobnicza. It is far more probable that this is a copy drawn by hand of the original from which a wood-cut was made for Stobnicza's work.

The second map, as regards the general outlines of the continents, bears a striking resemblance to the Apianus' map of 1520. There can however be no question of its being a direct copy, since the projection differs. There is moreover some difference in the legends of the two maps.

35. 1522. FA, fig. 18. A map of the world from ANTOINE DE LA SALLE's *La Salade nouvellement imprimée* etc. (Paris 1522). There are two variants of this map, the one reproduced, from Santarem, in the Swedish edition of Facsimile-atlas, the other in the English edition, from the original at the Royal Library, Stockholm. As regards the bibliographical data concerning the curious work for which the map was drawn, I must refer the reader to FA, p. 100. La Salle died in 1461, so the map was probably made in the middle of the fifteenth century, though printed in the sixteenth. As regards the cartography of Asia, it is of interest that the *Regio patalis* of Pliny and Roger Bacon is here placed south of the equator on that part of the surface of the earth occupied by Australia.

36. 1522. Three maps printed in the edition of PTOLEMY 1522, viz., *Tabula moderna Indiae orientalis* (FA, fig. 62), *Tabula Superioris Indiae et Tartariae Majoris* (FA, fig. 63), and a map of the world by LAURENTIUS FRISIUS (FA, pl. XXXIX). The discoveries of the Portuguese are completely ignored on the first two maps mentioned, though they claim to be new and special maps of the countries of Southern and Eastern Asia. Not even Malacca is mentioned. They are almost entirely founded on Marco Polo and on Behaim's globe. As I have pointed out in FA (p. 21), it is extremely doubtful whether Waldseemüller really had anything to do with the maps in the Ptolemy editions of 1513 and 1520. On the other hand it is distinctly stated that he composed, or reduced from the larger original to a suitable size, those maps which are entered in the Ptolemy editions of 1522 (1525 and 1541). The new maps that are introduced may therefore serve as a criterion of his ability as a geographer. It is curious that of the three new maps, two prove that in spite of all the teaching of St. Dié, Waldseemüller was evidently unaware of the Portuguese discoveries in Asia. The third moreover, *Orbis typus universalis juxta hydrographorum traditionem exactissime depicta 1522 L. F.*, is a very inferior production as a geographical representation of the world, both from a technical and cartographical point of view. It is probably this map which in *Catalogus auctorum ORTELIUS* cites with these words: »Martinus Waldseemüller, Universalem navigatoriam (quam marinam vulgo appellant) in Germania editam.» It is twenty years behind the times, and this period meant a good deal during the era of the great geographical discoveries. These maps seem to prove that Waldseemüller's skill as a cartographer has been very much over-estimated, at any rate when the geography of newly discovered countries is in question.

37. 1522. GARCIA DE TORENO. A Spanish chart, drawn by hand on parchment and embracing the southern coast of Asia. Several of the islands of Australasia, Camatra, Java, Timor, Gelolo etc., are laid down, as also "Linea divisionis Castellorum et Portugallensium". The map is signed: "Fue fecha en la noble villa de Valladolid por nuño garcia de toreno piloto y maestro de cartas de navegar de su magestad Año de 1522." It is preserved in the Biblioteca reale of Turin. I regret to say I have not seen this map nor any reproduction thereof (UZZELLI-AMAT, II, p. 239).



70. Representation of the Old Hemisphere from HONTER's *Rudimentorum Cosmographiae libri duo*, Cracoviae 1530. (Original size.)

38. (1522.) A small map of the Old World printed on the title-page of APIANUS: *Isagoge in typum cosmographicum seu mappam mundi (ut vocant) quam Apianus sub Illustrissimi Saxoniae Ducis auspicio praelo nuper demandari curavit.* (Final words:) *Impressum Landshut per Ioan-nem Weyssenburger* (s. a.). This map would be too insignificant to be worth mentioning here, were it not that the work was an announcement of a large map which is now lost. Possibly an earlier edition of Apianus' large map of 1530, entered below, may be meant. With respect to other editions or copies of the Isagoge, bearing another small map on the title-page, I must refer the reader to FA, page 101, and to HARRISSE (*Disc. of N. Am.*, p. 513).

39. (1522.) An oval planisphere printed from a wood-cut, signed "Opera di GIOVANNI ANDREA VAVASSORE ditto Vadagnino" (0.52 x 0.37 m.). La bibliothèque nationale in Paris, geographical department no. 244. The Military Library in Munich. The map does not seem to have been reproduced (HARRISSE, p. 518).

40. (1523) and 1524. N. pl. XLVII. Map of the world by JUAN VESPUCCI on equidistant polar projection and measuring 0.373 x 0.273 m. The whole was possibly intended to be pasted on a cylinder with a periphery of the same length as the equatorial circle of the map. The inscription runs as follows: "Totius orbis descriptio tam veterum quam recentium geographorum traditionibus observata novum opus Ioanis Vespucci Florentini macoleri (naucleri) regis Hispaniarum mira arte et ingenio asolutum." The only copy known of the first edition was in Count Manzoni's collection in Rome, but has since been lost. It is reproduced in HARRISSE's *Disc. of N. Am.* p. 532. A second impression of the same map, dated 1524, is in Prince Lichtenstein's collection in Vienna. The first is reproduced here from a photograph obtained from Mr. HARRISSE.

Juan Vespucci was a nephew of Amerigo and was often employed as a learned mariner by the Spanish Government. In 1512 he was Piloto de la Casa de contratacion (chamber of commerce) of Seville, then in 1515 royal pilot, and in 1524 member of the commission in Badajoz. He was greatly valued by Petrus Martyr, who avers (Dec. III: 54) that Juan had inherited Amerigo's maps, nautical instruments, and notes (HARRISSE, *Disc. of N. Am.*, p. 745). Under these circumstances we are surprised to find how very deficient in geographical knowledge, more especially as regards the southern parts of Asia, was the bearer of this great name. Asia is finished off in the south by five large peninsulas of which two are placed between the Indus and the Ganges. That peninsula most to the East, which is also the largest, extends to 45° S. Lat. Some of the names are distorted beyond all recognition and written in a manner that proves the writer to have known nothing of Latin.

The peculiar division of the map of the surface of the earth into a circle and two semi-circles that occurs here, is also met with in the magnificent map of the world inserted in Kepler's works: *Nova orbis terrarum delineatio singulari ratione accomodata Meridiano tabb. Rudolphi Astronomi-carum*, which according to another long inscription was designed by PHILIPPUS ECKEBRECHT CIVIS NORIMBERGENSIS and engraved by J. P. WALK in 1630 at Jo. Kepler's expense.

41. (1523.) A lost globe, mentioned in a pamphlet by SCHÖNER: *De nuper sub Castiliae et Portugaliae Regibus Serenissimis repertis Insulis ac Regionibus, Joannis Schöner Charolipolitani epistola et Globus Geographicus, seriem navigationum annotantibus*, Timiripa 1523. I mention this "Timiripa globe" of Schöner here, because several investigators, though erroneously in my opinion, have identified it with the anonymous print of a globe which in FA was given on pl. XL. It is here entered under No. 81, where references are given to the extensive literature concerning this globeprint.

42. (1523.) A large planisphere (2.074 x 1.000 m.) preserved in the Royal Library at Turin with legends in Spanish, often mixed with Latin phrases. The American part is reproduced by HARRISSE (*Disc. of N. Am.*, pl. XIX) who assigns this map to 1523.

43. 1524. Map of the world, entered in JODOCUS ISENNACHCENSIS (Jesse Trutvetter): *Summa in totam physice etc.*, Erford. per Mattheum Maler 1524, 4:0. A copy was offered for sale by Edwin Tross in 1868, but it has since disappeared. HARRISSE searched in vain for this map in all the chief libraries of Europe (*Disc. of N. Am.*, p. 537). As Trutvetter died in 1519, the map must have been drawn some years before the date when the book was published.

44. 1524-1598. Several maps and geographical drawings in *Cosmographicus liber* by PETRUS APIANUS, the first edition Landshut 1524; afterwards often reprinted with additions and corrections by GEMMA FRISIUS (compare FA, p. 101). In the first editions occur only small maps similar to those printed in a school geography; some of them are represented in FA, figg. 57, 58, and 64. After 1544 a somewhat larger map of the world was added to the work, which map is represented in FA, pl. XLIV. From a geographical point of view this map presents nothing of interest, except the peculiar form given to the north part of the New World. No continent corresponding to Terra Australis is there represented. But the title-page of Apianus-Gemma's *Cosmography*, published 1598 in Amsterdam, is ornamented with the small map of the world reproduced in fig. 69, which is divided into two hemispheres, and on which Terra Australis incognita fills an area almost as large as the rest of the world.

45. 1525. Two wood-cut maps of India and a map of the world, entered in PTOLEMY, Argentorati 1525, and printed from the same blocks as the maps in Ptolemy 1522.

46. (1525.) A large Spanish planisphere (2.13 x 0.81 m.) drawn on parchment. It belonged to the Marquis Castiglioni of Mantua and is said to have come into the hands of the family from Baldassare Castiglioni, Papal nuncio to Charles V. It does not appear to have been reproduced. (U.-A., II, p. 241).

47. 1527. FA, pl. XLI. A map which in 1527 was sent by ROBERT THORNE, an English merchant, to Dr. Leigh, ambassador from Henry VIII to Spain, with the statement that Thorne had obtained it from a pilot of Seville, together with a request that it might be kept secret to avoid unpleasant consequences to the pilot. This map was afterwards printed, it appears, without any alteration in HAKLUYT's *Divers Voyages* etc., London 1582. With the exception of a slight difference in the outlines of the third(!) Indian peninsula, Thorne's map, as regards the old world, is a faithful copy of the map in Reisch's *Margarita*, ed. 1515, and equally bad both as regards technique and geography. Alexander VI's celebrated line of demarcation between the tracts given to Spain and to Portugal is to be seen on this map with an account of the real import of the disputes raised by the interpretation of the Bull. According to the inscription on the left of map, it was a question of proprietary rights to the rich islands of Tharsis and Ophir, the supposed Eldorado of Australasia, now placed among the Moluccas. A short history of the line of demarcation (*la linea de demarcacion* or *la Raya*) and the negotiations carried on concerning it in Tordesillas in 1494 and Badajoz in 1524 is given by KOHL: *Die beiden ältesten Generalkarten v. America*, Weimar 1860. These negotiations are of great interest to mathematical geography since they prove that at that time, as the cleverest cosmographers openly admitted, there was no means of even approximately determining longitude astronomically. Magellan's Straits are here termed "Strictum omnium sanctorum", and at "Nova terra laboratorum dicta" there is an inscription probably added by Thorne himself, stating that Labrador was discovered by Englishmen. (Compare JOHN WINTER JONES: *Divers Voyages* etc.; *Works issued by the Hakluyt Society*, London 1850, and FA, p. 103.)

48. (1527.) N. fig. 41. A small map of the world on the face of title-page and first page¹ of *De orbis situ* etc. by FRANCISCUS MONACHUS.

¹ In the copy of this work in the British Museum, the planispheres are entered on the back of the title-page and on the first page of the text. This copy also is undated, but like my own is bound with a work of Schöner, dated 1527; both printed by Martinus Cæsar at the expense of Bollardus. A. E. N. II.

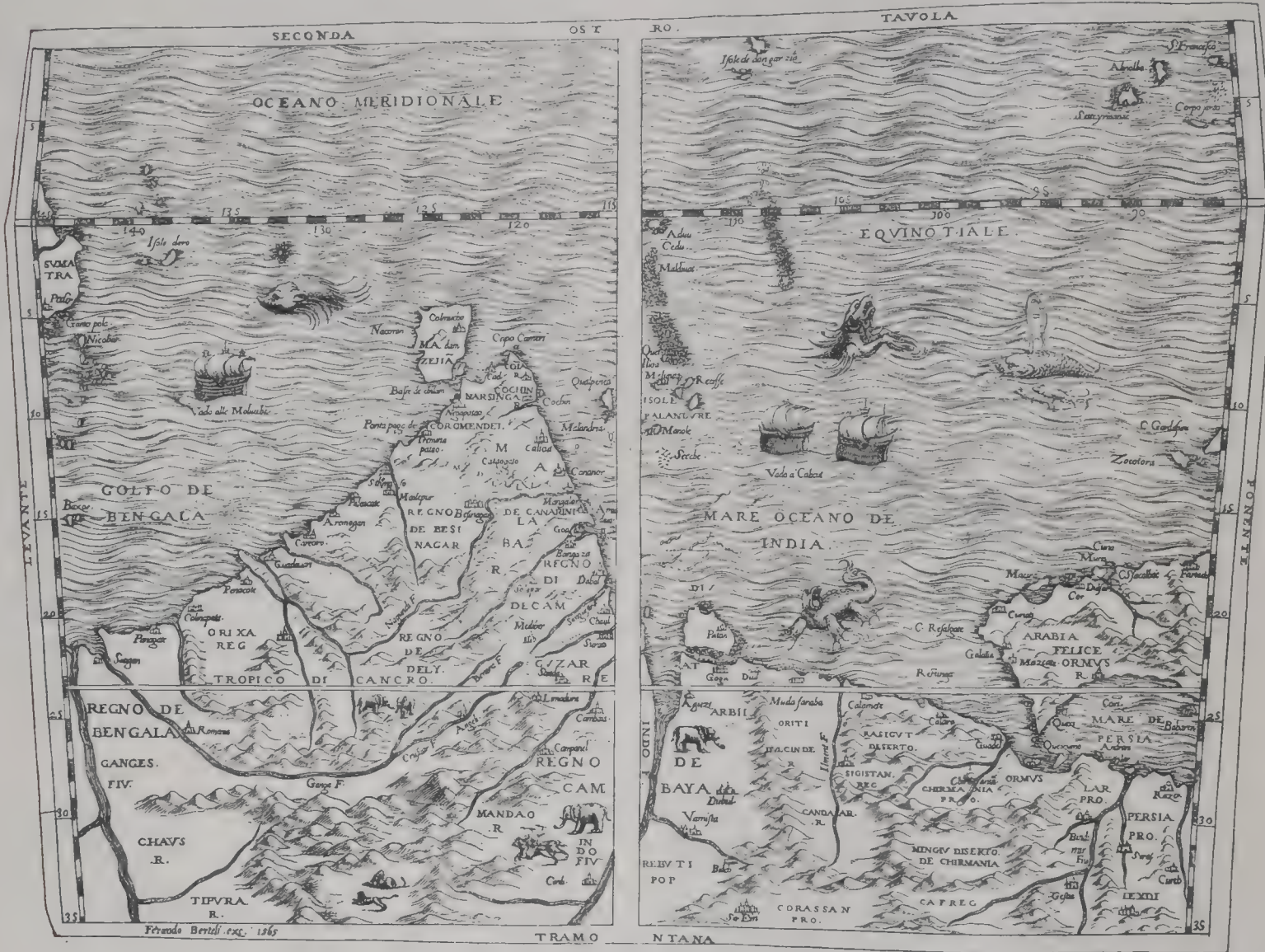
It is remarkable as the very first printed map where the surface of the earth is divided into two circular hemispheres.² North of the isthmus of Panama, the Atlantic Ocean and the Pacific are connected by a broad strait, while for the first time since these parts of the world had been more completely investigated, North America and Asia are drawn as one continuous continent. A large southern continent is marked. The work is undated, but is probably from 1527, not 1524 (*vide* p. 100, footnote). The back of the last page is devoted to a pretty printers device bearing the date 1525. Franciscus Monachus also seems to have published a map of the world on Bordone's projection. There is at all events such a map attributed to him, reproduced in LELEWEL's atlas, pl. XLVI. A map published by him: *Regiones Septentrionales, Antverpiae apud Sylvestrum a Parisiis* is cited in ORTELIUS' *Catalogus auctorum*. The edition Antverpiae 1565 of *De orbis situ* contains no map of the globe, but on the verso of the title-page there is a representation of a well-mounted globe, or armillary sphere, without the drawing of the land. *De Orbis situ* by Franciscus Monachus is reprinted by L. GALLOIS (*De Orontio Finaeo, gallico cosmographo*, Parisiis 1890).

49. 1527 and 1529. Two portolan-atlases in the British Museum by GIAMBATTISTA (Giovanni Battista) AGNESE cited by U.-A., II, pp. 113, 116. They also embrace America (and Asia?). Probably they emanate from the same productive map-maker who afterwards signed his splendid maps "Battista Agnese".

of the map, this being plainly proved by the manner in which the East Indian Peninsula and the South-Eastern part of China are reproduced. The supposition that Fernando Columbus was the author of this map is obviously a mistake.

Neither on this map nor on Ribero's maps of 1529 is any mention made of Zipangu or Japan. The mariner-cosmographer has on his map placed only those newly discovered lands that had really been sighted by the Spaniards and Portuguese. *Terra Australis*, of whose existence the theoretical cosmographers were so convinced, is also omitted.

51. (1528.) *Le globe doré* or *De Bure's globe* in the Bibl. nationale of Paris. (Circumference 0.70 m.) The globe is engraved on copper and gilded. The title *Nova et integra universi orbis descriptio* are stamped thereon, but the author and the date are not mentioned. G. MARCEL (*Reprod. de cartes et de globes etc.*, Paris 1893) gives a detailed description of it and an incomplete representation of the drawing of the Western Hemisphere. Asia is here made to join the New World, on the Southern part of which is inscribed "America inventa 1497". The North part contains the name of Mare Tabin(!), Baccalarum reg., Terra Francesca, Desertum Lop, Asia orientalis, Cathay (on the coast of the Mexican Gulf which is called here Sinus S. Michaelis), Tebeth, etc. The drawing of the globe corresponds with the double heart-shaped map of the world of 1531 by Orontius Finaeus (FA, pl. XLI), and with Schöner's globe of 1533. The legends are in Latin with some few Germanisms, which



71. The West Indian Peninsula by FERANDO BERTELI, 1565. (Original size 0.385 x 0.280 m.)

50. 1527. An anonymous Spanish map of the world in the Grand Ducal Library at Weimar signed: "Carta universal en que se contiene todo lo que del mundo sea descub[erto] fasta aora hizola un cosmographo de Su Magestad anno MDXXVII en Sevilla." The author is not stated, but the agreement of the map, even as regards details of decoration, with Diego Ribero's map of 1529 in the Propaganda Library proves this to be a work of the aforesaid cosmographer² or a copy of the original which Ribero employed. This again was obviously founded on the map composed by the Chamber of Commerce in Seville, the *Padron real*, now lost. Portuguese authorities also were accessible to the designer

lead HARRISSE to the conclusion that this is a German work. To me this seems extremely probable, as the drawing of the globe exactly corresponds to Caspar Vopel's globe of 1542, preserved in the Town-archives of Cologne. Possibly it is of a later date (about 1540) than that cited above on the authority of Marcel and HARRISSE.

52. 1528. FA, pl. XXXIX, p. 103. Map of the world in *Libro di BENEDETTO BORDONE, Nel qual si ragiona de tutte l'Isule del mondo etc.*, Vinegia 1528. The map is drawn on a fairly good projection, but is a coarse wood-cut and no trace can be found of the Portuguese discoveries on the south coast of Asia. South America is termed Mondo

² Among maps that have disappeared HARRISSE mentions one of 1495 (*Disc. of N. Am.*, p. 405), which was sent to Ferdinand and Isabella by Jaume Ferrer, and in which the surface of the earth was divided into two hemispheres, one North and one South.

³ Owing to some orthographical variations in the legends of these maps, this is contested by HARRISSE, who urges the supposition that the real author was Nuño Garcia de Torenio. But orthographical inconsistencies, even in the signature of the author's name, were very general even in the most carefully prepared portolan-maps, and as such this beautiful map must be classed. This, however, does not prevent the map from being founded on reliable state-ments and observations, made by mariners, and collocated by a clever royal cartographer, or as it then ran *Cosmographo de Su Magestad*, who, however, was little versed in Latin. Some slight mistakes in Latin in the map of 1527 are corrected in the map in the Propaganda Archives, e.g. the faulty *equinoctialis* and *tropicus capricornii* (near the left compass-rose of the map). *Mare congelatum* of the map of 1527 is altered to *oceanus septentrionalis* in the map of 1529.

novo, the Pacific Mare orientale. No continent at the South Pole is marked on the map. The same map is to be found in the editions of 1534 and 1547 of Bordone's *Isolario*, and probably also in the editions of 1532 and 1537.

53. 1528. FA, fig. 65. A small map of the world in PIETRO COPPOS *Portolano*, Venetia 1528. A wood-cut, very badly executed and of no geographical importance. The New World here consists of five large islands: Isola verde, Cuba, Spagnola, Jamaïqua, and Mondo novo (South America). There is no hint of the Portuguese discoveries in Asia. The same author in whose portolano this wood-cut appears, has also published a fine map of Istria engraved on copper.

54. 1529. Map of the world signed "Hieronymus de Verrazano faciebat" (2.6 X 1.3 m.). The date is gathered from the inscription: "Verrazano sive Nova Gallia quale discopri 5 anni fa Giovanni da Verrazano fiorentino per ordine e commandamento del cristianissimo re di Francia." Reproduced very incompletely and on a much reduced scale by J. CARSON BREVOORT: *Verrazano the Navigator*, New York 1874. The Indian peninsulas are given with fair correctness, but the Australasian islands, very imperfectly. Hieronymus Verrazano was a brother of the explorer Giovanni, who is said to have been hanged as a pirate in November 1527 by command of Charles V. The map is at the Propaganda Library in Rome. Formerly it belonged to Stefano Borgia.

55. 1529. N. pl. XLVIII, XLIX. DIEGO RIBERO's map of the world of which there are two somewhat differing copies, one in the Grand

This at the lower part is marked with the standards of the two rival powers. Diego Ribero was a Portuguese by birth (HARRISSE, *Disc. of N. Am.*, p. 733), but settled in Spain, where he was employed in various ways. He was commissioned, in concert with the two cosmographers Reinol, to draw a map for Magellan's expedition; became *Piloto de Su Magestad*, examiner of navigators, and finally was commissioned by Charles V to prepare a model map, which was unfinished when Ribero died in 1533. Moreover in his capacity of cosmographer he was present at the conference at Badajoz, which met to decide the position of the Moluccas in respect to the line of demarcation. Diego Ribero was certainly one of the best Hispano-Portuguese map designers. He had free access to all the official documents concerning the cartography of the New World and probably was able to obtain from Portugal any cartographical information he may have needed. We here see examples of very different mapping to most of the others mentioned in this list.

The Weimar map was first described by M. C. SPRENGEL (*Über die Riberos älteste Weltkarte*, Weimar 1795), afterwards by J. G. KOHL (*Die beiden ältesten Generalkarten v. Amerika*, Weimar 1860). Both have reproduced the American part of the map, or rather more correctly speaking that part comprising *Mundus novus*, for the term America is not used by Ribero. The map has moreover been the subject of a more or less exhaustive examination by most enquirers into the history of the first discovery of America. The map in the Archives of the Propaganda was described by E. T. HAMY (*Bull. de géogr. hist. et descr.* 1887, p. 57)



72. East Indies by FERANDO BERTEL, 1565. (Original size 0.384 X 0.277 m.)

Ducal Library of Weimar, the other in Archivio del Collegio di Propaganda in Rome. This latter copy which formerly belonged to Cardinal Stefano Borgia, is a magnificent map, drawn on parchment in the portolano style, and signed: "Carta Universal en que se contiene todo lo que del mundo se ha descubierto fasta agora: Hizola Diego Ribero Cosmographo de su magestad: Año de 1529. La qual se divide en dos partes conforme a la capitulacion que hizieron los catholicos Reyes de españa y el Rey don Juan de portugal en la Villa de Torde-sillas, Año de 1494." The map, like that of 1527 at Weimar, is plainly based on the lost *Padron real* of the Casa de contratacion of Seville. It differs from the map of 1527, with which it otherwise agrees even in the ornaments, by many important additions, e. g. the lengthy legends at *Tierra del Labrador*, *Tierra nova de Corte real*, *Tierra de Esteven Gomez*, *Tierra de Ayllan* and *Tierra de Garay* on the north coast of the New World, and *Tierra de Solis* and *Tierra de Patagones* on the south-east coast. The cartography of India and of south-eastern Asia is in this map also founded on exhaustive firsthand information from Portugal. The degrees of latitude are given on three of the meridians of the map, and the degrees of longitude on a parallel south of the equator. The first meridian coincides with the line of demarcation.

and reproduced in colours by W. GRIGGS 1887. It is this reproduction, that is here copied.

56. 1530. N. fig. 70. A small map of the old hemisphere, enclosed in a circle of 44 mm. diameter, entered partly on the title-page and partly in the text of IOANNIS HONTER CORONENSIS *Rudimentorum Cosmographiae libri duo*, Cracoviae MDXXX. This little map is the counterpart of a similar map, which also embraces the New World, that is introduced in the later works of Honter and reproduced in FA, fig. 71.

57. 1530. N. pl. XLIV. A beautiful heart-shaped wood-cut map of the world, by PETRUS APIANUS, reproduced here from an original in the British Museum. In the dedication, low down on the right-hand side, it is stated that the map is "ex recentibus observationibus confecta". Besides the chief map the work contains two small hemispheres with the inscription: *Observatio Ptolem.*, and *Observatio Vespu.* Petrus Bienewits Apianus was born in Leysnick 1495, and died in 1551. He was considered one of the best cosmographers of his time. He was one of the first to propose the determination of longitude by measuring moon-distances (*Cosmographicus liber*, I: 10). Under such circumstances this map is a remarkable proof of the want of knowledge concerning the Portuguese voyages of discovery in Asia which prevailed outside the Iberian peninsula.

There is certainly a dotted line with the inscription: "Hac via Portugalenses navigant ad Calicutum", but with this the store of knowledge possessed by the Ingolstadt astronomer as regards the new discoveries in Asia seems to have been completely exhausted. The drawing of the south and east of Asia is entirely founded on Ptolemy and Marco Polo. Even in respect to the contour of *America Terra nova* the drawer of the map is twenty years behind his times, during a period when geographical discoveries multiplied with astonishing rapidity.

58. 1530. Map by APIANUS, similar to the map of 1520, but entitled: "Typus Orbis universalis juxta Ptolemei Cosmographi traditionem et amrici(?) Vesputii aliorumque lustrationes a Petro Apiano Leysnico et elucubrando. MDXXX. Ghedruct &atwerpen by mo peter de vales de guldenhant. I cite this map from HARRISSE (*Bibl. Am. Vetustissima*, p. 276 and *Disc. of N. Am.*, p. 578), who saw it bound in a copy of Peter Martyr's Decades, printed in Alcalá 1530.

59. (1530.) An anonymous undated map (0.290 X 0.211 m.) in a manuscript *De principiis astronomiae* (British Museum, Sloane MSS., 117). HARRISSE, *Disc. of N. Am.*, p. 579. The drawing of the New World resembles the map of Franciscus Monachus.

60. 1530. Map in the Grand Ducal Library of Wolfenbüttel, of the same type as Ribero's planisphere in the Propaganda Archives, though with slightly modified legends (2.21 m. X 0.75 m.). Among these there is a remarkable addition to the inscription near Labrador, where it is stated that the man who first gave information concerning the land was a workman (labrador) from the Azores; hence the name. (HARRISSE, *Disc. of N. Am.*, p. 580.)

61. 1531. FA, pl. XLI. ORONTIUS FINAEUS. Double heart-shaped map of the world: *Nova et integra universi Orbis Descriptio*, probably first printed as a loose sheet, but afterwards often included in (GRYNAEUS): *Novus Orbis*, Parisiis 1532. The map was reprinted from the same block, but with the legend of the title altered, by omission of Orontius' name and changing of the date to MDXXXV, in GLAREANUS' *Geographia*, Brissae 1536 (FA, p. 74, footnote), as also according to HARRISSE in an edition of Pomponius Mela published in 1540. The wood-cut is well executed, rich in names, and remarkable for its projection which in the middle of the sixteenth century seems to have found favour with learned and unlearned geographers, as also because North America, in accordance with Columbus' opinion, forms the north-east coast of Asia. The Pacific forms only the most eastern of three great gulfs which project from the ocean into the continent of Asia-America: *Mare Indicum*, *Mare Gangeiticum*, and *Mare de Sur*. Several names from the Spanish and Portuguese voyages of discovery here meet the eye, though they are so placed as to exclude the possibility of any extensive firsthand information having been used for the work. The drawing of the map in the neighbourhood of the North Pole proves that Ruysch's map formed one of the sources drawn on by the French geographer. The drawing of Finaeus' map is in other respects in accordance with Schöner's globe of 1533 and the Globe doré (*vide supra* No. 51).

62. 1532. FA, pl. XLII. Oval map of the world in (GRYNAEUS): *Novus Orbis*, Basiliae 1532. Probably by SEBASTIAN MÜNSTER. A composition of no value whatsoever, proving that only vague rumours had reached the maker of the map concerning the great discoveries of the Portuguese in Asia. The contours of this continent are chiefly drawn according to Ptolemy's maps of Asia. The same map with but unimportant alterations is found in the editions of 1537 and 1555 of *Novus Orbis*. (*Vide HARRISSE, Disc. of N. Am.*, p. 587.)

63. 1532. A portolan-atlas by BARTOLOMEO OLIVES consisting of 11 maps (*vide supra* p. 65). Some of these are however doubtless of a later date. Map I is a map of the world. Maps IX and X comprise parts of the New World. Nothing remarkable as regards geography is presented by this work from the very productive map-factory of Olives in Messina (U.-A., II, p. 241).

64. 1532. A map included in the second edition of BARTOLOMEO DALLI SONETTI'S *Isolario*, and entitled *Figura e scrittura insomma di tutto lo abitato, Venezia 1532* (0.295 X 0.155 m.). This oval map of the world on Bordone's projection is a wood-cut of little interest, signed: "F. Rosello Florentino fecit."

65. 1532. Eight maps in ZIEGLER'S *Quae intus continentur etc.*, Argentorati 1532. The full title and bibliographical data will be found in FA, pp. 60 and 105. Some of the maps treat of the Mediterranean countries of Asia, and of these *Tabula universalis Palestinae* is here reproduced (fig. 68) both because the declination of the compass² is indicated thereon, and because the map contains information concerning the distance between the more important places and their direction with respect to one another. The details must be reminiscences of those maps on which the portolanos were based. A new edition of Ziegler's work was published in 1536, the maps being printed from the old blocks.

66. 1533. A globe by SCHÖNER, mentioned in his *Opusculum geographicum etc.*, *Ex urbe Norica 1533*. The globe itself is said to have been rediscovered by Wieser in the Military Library at Weimar. It is drawn by hand, and is 0.261 m. in diameter. The southern hemisphere is reproduced by WIESER (*Magalhães-Strasse und Australkontinent*, Innsbruck 1881), the western hemisphere by HARRISSE (*Disc. of N. Am.*, p. 520). In *Opusculum geogr.* there is a wood-cut, representing a mounted globe. In this wood-cut, which is reproduced in FA, fig. 49, we find the usual modified Ptolemaic type of the south and south-eastern coasts of Asia; no Australian continent is marked. Wieser, however, declares that the drawing of the globe at Weimar so entirely corresponds with Orontius Finaeus' map of the world of 1531, that one of the works is plainly a copy of the other. A complete dissimilarity would thus exist between the division of land on the picture of the globe, on what evidently was the sale-programme, and the real globe. This seems to me evidence

against identifying the anonymous and undated Weimar-globe with that spoken of in Schöner's *Opusculum geographicum*.

67. 1533. Representation of a globe (FA, fig. 49) and a small map of the old hemisphere in JOANNES SCHÖNER'S *Opusculum geographicum ex diversorum libris ac cartis summa cura et diligentia collectum, accomodatum ad recenter elaboratum ob eodem globum descriptionis terrenae. modatum ad recenter elaboratum ob eodem globum descriptionis terrenae. modatum ad recenter elaboratum ob eodem globum descriptionis terrenae. modatum ad recenter elaboratum ob eodem globum descriptionis terrenae.* The map of the Old Hemisphere is very like a similar picture in *Globus mundi*, Argentorati 1509 (FA, fig. 22). These insignificant geographical sketches would not deserve to be inserted here but for the interest they have for the much debated question of the authorship of several undated globes from the first half of the sixteenth century.

68. (1534.) A Catalan atlas preserved in the Town Library at Havre, containing thirteen maps rudely drawn on parchment (0.40 X 0.23 m.). In his *Discovery of North America*, p. 601, HARRISSE gives a full analysis of this atlas, of which I have not seen either the original or any reproduction.

69. 1534. FA, fig. 66. Map of the world by JOACHIMUS VADIANUS: *Epitome trium terrarum partium*, Tiguri 1534. The surface of the earth is laid out on a beautiful projection. The New World forms two large islands *Terra de Cuba* and *America*, separated by a strait at Panama, these islands being of the same form as in Grynaeus, Basiliae 1532. The south coast of Asia is however drawn in a somewhat different manner, as the Indian peninsula, which is not found in Grynaeus, is marked here. No names occur that call to mind the new discoveries, nor is there any continent marked at the South Pole.

70. 1535. A map of the world and two tabulae modernae of India in PTOLEMAEUS, Lugduni 1535. Printed from the same blocks as the maps in the Ptolemy-edition of 1522, which are reproduced in Facsimile-atlas (*vide supra* No. 36).

71. 1535. The map in the Basel edition of REISCH'S *Margarita philosophica* of this year. A new edition of map no 25, slightly varied by the omission of "Zoana Mela" and various other legends. It does not always appear in all copies of *Margarita* 1535, but is sometimes wanting altogether, or is replaced by the maps of 1503 (No. 10) or 1515 (No. 25). Compare FA, p. 107.

72. (1535.) A hand-drawn wooden globe of 0.2 m. in diameter, now at the Bibl. nationale in Paris, probably drawn by VOPEL. HARRISSE gives a picture of the New Hemisphere on this globe and considers it as drawn about 1535, since the colony St. Michael founded by Pizarro on the north-west coast of Peru, in 1532, is marked on the globe. Asia and North America are connected by a broad belt of land. The Gulf of Mexico is called "Mare Cathaïum". In the south there is a large continent bearing the legends *Patalis regio* and *Terra australis recenter inventa Anno 1499*. The same legend with the date 1499 occurs on the globe of Vopel in the Town Archives at Cologne. The New World and the Australian continent are drawn on the same pattern, which was also closely followed in *Globe doré* (*vide supra* No. 51), in Finaeus' double heart-shaped map of 1531, in Schöner's (?) globe of 1533, and in Vopel's globes.

73. (1536.) Heart-shaped map of the world by ORONTIUS FINAEUS: *Recens et integra orbis descriptio. Orontius F. Delph. Regi Mathematicus faciebat* (0.58 X 0.32 m.). The map is mentioned in GESNERS *Bibliotheca universalis*, Tiguri 1545, as also in various other works and records of the sixteenth century. Probably on account of the projection it was a favourite, and sold well. Now, as far as I know, there is but one copy extant, which is preserved in the archives of the French Foreign Office. This is reproduced and described by GALLOIS (*De Orontio Fineo*, Parisiis 1890). As regards cartography, the French original is exactly similar to the copy etched in copper: *Cosmographia universalis ab Orontio olim descripta. Ioannes Paulus Cimerlinus Veronensis in aed incidebat anno 1566*. This latter has been reproduced in FA, fig. 53.

The most remarkable characteristics of Orontius' maps are the projection, the large "Terra australis nuper inventa sed nondum plene examinata", marked on the map, and the connection which, according to the example of Franciscus Monachus, the mapmaker deems to have existed between Asia and America. In drawing the lands round the North Pole, Finaeus has followed Ruysch's models.

74. 1536. Portolanos in Biblioteca Barberiniana in Rome, possibly by AGNESE (HARRISSE, *Disc. of N. Am.*, p. 625).

75. 1536—1564. Portolan-atlases by BATTISTA AGNESE (compare p. 65 of this work and pl. XXIV). There are a number of portolan-atlases extant by this very clever map-drawer or map-manufacturer, some signed, some unsigned, but easily recognised by their artistic execution and by the legends, as also that among the maps one of the world is included, on which some of the most used ocean-routes of the sixteenth century are marked. Battista Agnese's activity as a mapper lasted from 1536—1564; if Giambattista is only a variation of Battista (*vide supra* No. 49), from 1527 to 1564.

In respect to artistic skill and elegance, Agnese's maps are among the most perfect of such works from the sixteenth century. As regards geography they are not of an equally high standard. They are, however, interesting, since they show what ideas prevailed in the middle of the sixteenth century concerning the division of land and sea on the surface of the earth. Agnese's maps, which in 1570 must have been in pretty general use in the libraries of Europe, are not mentioned in ORTELIUS' *Catalogus auctorum*. There are also still extant by Agnese special maps, e. g. of Cyprus and of Europe and of Russia. The latter is a copy of the map which Paulus Jovius drew from information received from Dmitri Gerasimov, ambassador from the Grand Duke of Russia to the Pope (FA, p. 114).

For further particulars I must refer the reader to KOHL'S *History of Maine*, p. 292—295, to p. 211 of THEOB. FISCHER'S work quoted above, HARRISSE (*Cabot*, p. 188—194, *Disc. of N. Am.*, p. 626—630), UZIELLI-AMAT, etc.

² Not for the first time on a map, as I formerly imagined. According to HEINRICH LUTZ (*Die ersten Spezialkarten Bayerns; Jahresber. d. Geogr. Gesellsch. in München für 1886*, p. 76) the declination is noticed on Joh. Aventinus' map of Bavaria dated 1523 (not 1533, as is generally stated).

76. 1538. FA, pl. XLIII. A wood-cut map of the world by GERARDUS MERCATOR on Finæus' double heart-shaped projection. The sole copy still extant is in J. Carson Brevoort's library. (WINSOR: *A bibliography of Ptolemy's Geography*, p. 22). Mercator makes a broad ocean belt, "Oceanus orientalis Indicus", divide Asia from "Americae pars septentrionalis". South America is called "Americae pars meridionalis". Peru is designated "Regio cultissima ditissimaque". An extensive continent is marked at the South Pole, and there is a North Pole continent of about the same dimensions. By this we see that, as yet, Mercator had not adopted Ruysch's remarkable polar archipelago. The first map published by Mercator was a map of Palestine of 1537, now lost; then comes the map of 1538, which, so early as 1560, was nicely copied by LAFRERI in a very fine copper-plate, of which many copies are still extant and which in its turn has been reproduced in FA, fig. 54.

77. 1538. N. fig. 60. A map of Asia in C. JULI SOLINI *Rerum toto orbe memorabilium thesaurus locupletissimus* etc., Basileae 1538 (FA, p. 108). This wood-cut is unusually bad from a geographical point of view. Only Calicut and Malacca give a hint of the new discoveries. But Calicut is placed far west of the Indus, no peninsula projects between the Indus and the Ganges, and no Australasian islands are marked on the map. In one respect, however, it is remarkable. In the north-east corner there is a coast, "terra incognita", whereon are two trees. This land is placed almost where California is, and is separated from East Asia by a broad ocean. It almost seems as if the drawing was founded on a voluntary or involuntary voyage from the east coast of Asia to the north-western part of the New World.

back of Münster's maps. His map of *Novus Orbis* is a rude wood-cut and of little geographical importance. It is, however, of interest as being that map of the New World which in the middle of the sixteenth century had the largest circulation in countries north of the Alps.

81. (1540.) FA, pl. XL. One of the many maps in gores, which during the first part of the sixteenth century were published in Germany without any statement as to author (or draughtsman), place of printing, or printer's name. It has been identified with Schöner's lost globe of 1523, plainly without sufficient reason. (Compare FA, p. 82; HARRISSE, *Disc. of N. Am.*, p. 519.) I infer that the work was done in Nuremberg, the only town in central Europe marked on the map, and possibly by GEORG HARTMANN, a celebrated maker of mathematical instruments and globes of this town (FA, p. 82, English edition). Magellan's voyage round the world is marked in the same manner as in the portolanos drawn by Battista Agnese in Venice. Asia is here extended over the north part of the Pacific, as far as to America, from which it is separated by a long strait running south of the Polar Circle, a type of drawing for which Sebastian Münster shows a special predilection. India forms a large peninsula between the Indus and the Ganges, with several well-known names from the Portuguese voyages of discovery. Off the East Indian peninsula Malacca, "Samotra olim Tabrobana", and Java are marked. Moreover from the south coast of Asia there projects a third peninsula, lying still more east and as large as India. Beyond this the Moluccas are marked in such a manner and with such a nomenclature as to exclude the possibility of direct information from the Spanish authorities, Spanish cosmographers or any of those who took part in the voyage of the Victoria.



73. Sumatra by GASTALDI. From Ramusio, III, 1556. (Size of original 0.360 x 0.098 m.)

78. 1538. N. pl. XLI. JOÃO DE CASTRO. Fifteen harbour-charts in *Primeira Roteiro da Costa da India desde Goa até Dio* etc. (vide supra p. 148). These harbour-charts, the first known of the kind and the earliest special maps of any part of the southern littoral of Asia, are of great scientific interest (as are those mentioned under No. 85) if compared with the maps of the same locality of the present day.

79. 1540—1578. A map of the world (FA, pl. XLIV) and a map of Asia (N. fig. 61), printed from the same blocks in all Latin and German editions of SEBASTIAN MÜNSTER'S *Ptolemaeus* and of his *Cosmography* (FA, p. 23 and 108) that have fallen under my notice. The first edition of Münster's *Ptolemaeus* was printed in 1540, the *Cosmography* in 1544. The map of Asia is not very rich in detail, but gives the outlines of the south and east coasts far more correctly than most other contemporaneous works of this kind. For a long time this was the map of Asia that was most spread in the countries north of the Alps.

80. 1540—1578. FA, fig. 73. SEBASTIAN MÜNSTER'S *Novus orbis*. This comprises America, the east part of Asia, Spain, and the most western part of Africa, and is printed from the same block in all editions examined by me of Münster's *Ptolemaeus* and in the editions of his *Cosmography* printed in Germany. Some of the legends, which are printed with movable type, vary in the different proofs, Harrissee who has seen this same map inserted in several copies of GRYNÆUS' *Novus orbis*, Basileae 1532, considers that the map was printed as a loose leaf previous to 1540, in which he is probably correct. At least the year 1523 is engraved in the frame of some of the explanatory remarks generally printed at the

A. E. N. II.

In the afore-mentioned work by FIORINI (*Boll. d. Soc. Geogr. Ital.* 1894, p. 277) a short epitome is given of the divers opinions concerning the author of this globe-print. I do not consider I have any cause to abandon the opinion I once expressed. Further I consider it improbable that Schöner made any one of those unsigned globes that have been ascribed to him.

82. 1541. A map of the world in the Dresden Library signed "Faite à Dieppe par NICOLAS DESLIENS 1541", 1.10 x 0.635 m. (W. RUGE: *Zur Geschichte der Kartographie*; *Kettlers Zeitschr.* 1891, p. 404). A planisphere by Desliens of 1566 is mentioned in *Notice des objets exposés dans la section de géogr.*, Paris 1889, p. 17.

83. 1541. Map of the world and two maps of India in PROLEMAEUS, Lugduni-Viennae 1541, printed from the same blocks as the maps in *Ptolemaeus* 1522.

84. 1541. MERCATOR'S globe, or printed gores, on Glareanus' projection, signed "Edebat Gerardus Mercator Rupelmundanus cum privilegio ces. Majestatis ad an. sex. Lovani an. 1541". This print, which was probably much spread and used for the making of globes long since destroyed, had entirely disappeared until, in 1868, it was discovered bound with a folio pamphlet with the gores for Mercator's celestial globe. A photo-lithographic reproduction thereof was published in 1875 by Mr. MALOU, then Minister of Finance in Belgium, but in an edition of only 200 copies, which were distributed to friends and amateurs. This new edition has become rare (FA, p. 82). But since it was published copies of the original have been found in the Imperial Library of Vienna,

the Observatory in Paris, the Grand Ducal Library at Weimar, the Germanisches Museum at Nuremberg, the Archeological Society's library of St. Nicolas of Waes (Belgium) and the libraries at Cremona and Urbana in Italy (FIORINI: *I Globi de Gerardo Mercatore in Italia*; *Boll. d. Soc. Geogr. Ital.* 1890). In this globe-print a considerable increase on Mercator's geographical knowledge of 1538 is observable, but there still reigns a curious confusion concerning the geography of southern Asia, which proves that original information from these tracts was sparsely spread beyond the boundaries of Portugal. Obviously the Portuguese original maps were still kept secret in consequence of the claims put forth by the Spaniards to some of the Asiatic possessions or trade districts of Portugal, and the uncertainty of the cosmographers as to which side of the line of demarcation they really were on. This last question was difficult to settle with the imperfect methods of determining longitude in those times.

The projecting part of Asia's mainland between the Ganges and the Indus is on Mercator's globe divided by *Moabar Sinus* into two peninsulas of about the same size. Farther to the East there are again two large gulfs: *Gangeticus Sinus* and *Sinus magnus*. The large peninsulas of Southern Asia have thus been doubled, as also some of the islands of Australasia. The south polar continent has been given an immense extension and many remarkable legends may be read, for which I must refer the reader to the original or to Mr. Malou's reproduction.

85. 1541. N. pl. XLII. Sixteen maps by JOÃO DE CASTRO in his *Roteiro... de Goa atee Soes* etc. (*vide supra* p. 148.)

86. 1542. N. fig. 67. A map of the world by HONTER, exactly like that described below under No. 92, but printed from another block containing fewer names and signed "Coronae MDXLII". My illustration is from the reproduction in HENRY STEVENS' *Historical and Geographical Notes*, New Haven 1869. The map is there called by the misleading appellation of "Honters globe 1542", for which reason many authors class it among globes.

87. 1542. N. pl. L. Map of the world by ALONZO DE SANTA CRUZ, preserved in the Royal Library at Stockholm (1.44 X 0.79 m.). Title: *Nova verior et integra totius orbis descriptio nunc primum in lucem edita per Alfonsum de Sancta Cruz Caesaris Charoli V. archicoscographum*, A. D. MDXLII. It was probably brought home to Sweden by J. G. Sparvenfeldt, who in 1689-94 travelled about in Europe seeking Swedish and Gothic antiquities. The map of the globe is here divided into two hemispheres, one north and one south, of which each is divided into 36 segments in a way shown in the reproduction on pl. L. The map may be cut out and, with but slight distension of the material, on which it is drawn, may be pasted on a sphere and thus form a globe. This, however, was probably not the sole intention of this new projection¹ introduced by Santa Cruz, but the chief idea was to obtain a map on which the distances between different places could at once be found. At all events the following words cited by HARRISSE from a work by VANEGAS DE BUSTO (*Las diferentes de libros que ay en el Universo*, Toledo 1540, Chap. XVI) seem to refer to maps of this kind: "Ora nuevamente Alonso de Santa Cruz, a petición del Emperador, ha hecho una carta abierta por los meridianos, desde la equinocial a los polos; en la cual, sacando por el compas la distancia de los blancos que hay de meridiano a meridiano, que de la distancia verdadera de cada grado, reduciendo la distancia, que queda, a leguas de linea mayor."

The map is fully described and carefully reproduced by E. W. DAHLGREN in his *Map of the world by Alonso de Santa Cruz*, Stockholm 1892. In the present work I can only reproduce it on so small a scale that the legends mostly become illegible, as, even on the original, they are inscribed with extremely fine and almost illegible writing. All the legends, so far as it has been possible to decipher them, are given in Dahlgren's work. Those that occur on the coasts of the New World will be given here in the next chapter.

Santa Cruz was cosmógrafo real, or, as he himself renders the title in Latin, archicoscographus to the Emperor Charles V. He had been a member of the unsuccessful expedition undertaken by Sebastian Cabot to La Plata. He took a part in the editing of Padron real and was entrusted with many confidential geographical commissions by the Spanish sovereign. From this it may be gathered what importance attaches to this, the sole remaining large map by Santa Cruz, which, together with a map of Mexico (FA, fig. 69), is still extant.

88. 1542. A map of the world in the British Museum (2.49 X 1.27 m.). *Catal. of the manuscript maps etc. in the British Museum*, London 1844, p. 22. Add. MS. 5413. Previously belonged to Edward Harley, Earl of Oxford.

89. 1542. Several maps in *This booke of Idrography is made by me Johne Rotz* etc. Final words: *in the yer of our Lord Gode J^m V^e XLII*. (*Catal. of the manuscript maps etc.*, p. 23. HARRISSE, Cabot, p. 201.)

90. 1542-1545. Several globes by CASPAR VOPEL (born in Medebach, 1511, died 1561). Of these I have only been able to examine closely:

a) 1542. A globe (diameter 0.28 m.), at the Town-Archives at Cologne, dated 1542. It is reproduced by MICHOW² but very imperfectly, as the most interesting part of the globe for the cartography of that time, the northern half of the old hemisphere, is omitted. The distribution of land closely coincides in other respects with the small globe by Vopel, which is depicted in FA, pl. XL. The larger globe is, however, more rich in legends, among which the following, opposite Ta-

probane on the extensive continent surrounding the South Pole is worth recording: "Brasielie Regio. Terra Australis recenter inventa, sed nondum plene cognita. Anno 1499." The globe bears the title: *Nova et integra universi orbis descriptio... Caspar Vopelleus Medebach geographicam spheram hanc faciebat Coloniae A. 1542*.

b) 1543. A small globe, placed in the centre of an armillary sphere now in "Oldnordisk Museum" at Copenhagen (FA, pl. XL, p. 82), and a similar globe, the property of Mr L. Friederichsen of Hamburg (represented in Michow's work), both signed and dated.

c) 1545. A globe by Vopel of this year, described by J. H. GRAF in *Festschrift der Geographischen Gesellschaft in München, herausgegeben von E. OBERHUMMER*, 1894, p. 228. Graf gives an enlarged reproduction of the drawing of the map. This resembles that of the globe in Copenhagen and the globe in Hamburg described by Michow. These small globes agree both in size and also in being mounted as astrolabes or armillary spheres. Their chief characteristic is that, according to the example set by Franciscus Monachus and Orontius Finaeus, Asia and America form one united continent. This is objected to in a letter from Postel to Ortelius dated April 9th 1567 (*Abrahami Ortelii epistolae*, ed. J. H. HESSELS, Cantabrigiae 1887, p. 43). On the south coast of Asia, many names from the Portuguese voyages of discovery meet the eye, but like the outlines of the country are disposed in a very arbitrary manner.

Besides the works mentioned above we still have a globe by Vopel from 1544, at Salzburg (FIORINI, *Boll. d. Soc. Geogr. Ital.* 1894, p. 278). Moreover, both "Le Globe vert" and "Le Globe doré" (*Vide Nos 27 and 51*) in respect to the outlines of the map are so identical with Vopel's globes, that they must either have been executed by him or drawn from the model he employed.

91. 1544. An oval map of the world by SEBASTIAN CABOT, a coloured copper-engraving at Bibl. nationale in Paris. It is the sole copy extant, not only of this probably widely spread map³, of which, according to HARRISSE, three or four editions were issued, but also of all the cartographical works by John and Sebastian Cabot which are mentioned in literature, or in contemporaneous writings and documents. Concerning these I must refer the reader to HARRISSE's excellent and erudite monograph: *Jean et Sébastien Cabot*, Paris 1882, as also to his *Disc. of N. Am.* The map is reproduced by JOMARD, but many of the legends are omitted.

92. 1546. A map of the world (FA, pl. XLIV) and twelve other maps, of which three treat of parts of Asia, in JOHANNIS HONTERI *Rudimenta Cosmographica*, Tiguri 1546, as also in several later editions⁴ of the same work. Some of these maps are also printed from the very same blocks by JOHANN STUMPF in *Gemeiner loblicher Eydgnosenschaft Stetten, Länden und Völckeren...*, bey Christoffel Froschouer, Zürich MDXLVIII. When drawing the south coast of Asia no notice has been taken of the Portuguese discoveries; the outlines of Africa are approximately correct; the New World forms two large islands, separated by a broad strait at Panama, that to the north being called *Parias*, that to the south *America*. The three remaining maps, which concern Asia, are:

1. Map of the country between the Mediterranean and Tigris.
2. Map of Asia Minor.
3. A map of Central Asia, Arabia and India, drawn on the Ptolemaic model.

Honter's *Rudimenta Cosmographica* with its metrical text is interesting as the first modern, not Ptolemaic, collection of printed maps. Regarding the bibliographical data concerning this little work *vide* FA, p. 111.

Honter's *Rudimenta Cosmographica* must not be confounded with *Rudimentorum Cosmographiae libri duo*, by the same author, the first edition of which was printed in Cracow 1530 (FA, p. 112). That little work is written in prose and contains no other maps than a couple of insignificant geographical diagrams. (*Vide supra* No. 56.)

93. 1546. N. pl. LI-LIII. A large map of the world, magnificent and rich in legends, signed "Faictes à Arques par PIERRE DE DESCÉLIERS presb're 1546". Until H. Major discovered and deciphered this inscription⁵ the map was usually cited as *Mappemonde de Henri II* and its date ascribed to 1542. The mapmaker's ideas concerning the distribution of land are best seen from the accompanying reproductions. These prove how important and full of names the map is. Special interest, moreover, attaches to the author in consequence of the following words in G. FOURNIERS *Hydrographie*, second edition, Paris 1667, p. 506: "La 3^e espeece est de certaines Cartes qu'on appelle Reduites, dont un nommé le Vasseur, natif de Diepe, a enseignée la pratique à nos François. Cet homme quoy que Tisseran en son bas aage, ayant eu quelque instruction d'un nommé Cossin, homme fort ingénieux et qui avoit une excellente main et veu les memoires de certains Prestres d'Arques, Bourg près de Diepe, qui estoient excellents Geographes, dont l'un se nommoit des Celiers, et l'autre Breton, a si bien sceu menager ce peu de lumiere qu'il a receu d'eux, qu'à force d'esprit et de travail continu, il est arrivé à tel point qu'il a esté admiré de plusieurs." Desceliers was teacher to Levasseur, who introduced in France maps drawn on Mercator's projection. The above citation, according to HARRISSE, is moreover the source of everything which has been written about the cosmographers of Dieppe.

94. 1546. Portolano by JOÃO FREIRE (0.34 X 0.27 m.). SANTAREM: *Recherches sur la priorité etc.*, Paris 1842, p. 127, as also *Essai sur l'hist. de la Cosmographie*, Paris 1852, III, Introd. Was in Baron Taylors' library, afterwards in the possession of Libri and sold by him in 1859. *Catal. of the extraordinary collection of splendid manuscripts*, London (1859), No. 827. HARRISSE, Cabot, p. 220.

¹ The same projection was afterwards employed by Florianus on the beautiful map of the globe described under No. 106.

² H. MICHOW: *Caspar Vopell, ein kölnner Kartenzeichner des 16. Jahrhunderts*. *Festschrift der Hamburgischen Amerika-Feier* 1892.

³ As I have before mentioned almost all the wallmaps of the XVI century have had the same fate. They have been hung up, admired, burnt by the rays of the sun, grown dirty, been taken down, sent to the lumber-room, forgotten, and destroyed.

⁴ Honter's small atlas was still printed from the old much worn blocks, and with its unchanged versified text and maps, under the title of *Enchiridion Cosmographiae*, Tiguri apud Iohan Wolphium MDIIC. On the worn block of the map of the world the date is altered to MDXCVI.

⁵ "In the top left hand corner, near Japan" (HARRISSE, Cabot, p. 216). There must be some mistake, as Japan lies on the right hand side of the map at a good distance from the upper corner.

95. 1546. Map of the world by GASTALDI (0.64 × 0.38 m.). Signed: "Giacomo Cosmographo in Venetia MDXXXXVI". CASTELLANI's catalogue, p. 248. *Catal. of printed maps in Brit. Mus.*, II: 4554. This map probably coincides, except as regards size, with the oval map included in Ptolemy 1548.

96. 1547. Atlas signed "NICHOLAS VALLARD de Dieppe, dans l'année 1547". BARBIÉ DU BOGAGE, who describes this collection of maps, considers that this inscription gives the name of the drawer, others that it means a former owner of the map. (R. H. MAJOR: *Early voyages to Terra Australis*, London, *Hackluyt Society* 1859, p. xxxv.) It belonged to Talleyrand and was afterwards included in Sir Thomas Phillip's collection at Cheltenham. North-eastern America has been reproduced by KOHL (*Disc. of Maine*, pl. XIX).

97. 1548. Maps by GASTALDI in Ptolemaeus, Venetiis 1548 (FA, p. 25). This small but fine edition of Ptolemaeus contains 60 maps, of which 34 are tabulae modernae, and of these the following concern Asia: Moschovia; Soria; Persia; Arabia Felice; Calecut (N. fig. 62); India Tercera (N. fig. 63); Universale nuovo (FA, pl. XLV); Carta marina universale (FA, pl. XLV). The maps consist of fine copper-plate prints, and it is obvious that the author has tried to obtain the best information possible concerning the countries lately discovered.

The maps in Ptolemy 1548 are remarkable in another respect. It was through them that copper-engraving was reintroduced into the service of cartography. During the fifteenth century the maps for Ptolemy, Bologna 1462 (probably 1472), for Berlinghieri's *Geographia* c. 1480, for Ptolemy 1478 and 1490, and for Nicolaus a Cusa's map 1491, or, in all, more than eighty maps in folio had been engraved on copper; but if we except the reprints from the plates of 1478 for the Rome editions of Ptolemy 1507 and 1508, only a very few maps engraved on

100. 1550. Maps by GASTALDI in Ramusio's well-known collection of travels, in three volumes; several editions were issued from 1550 to 1613.

In the first volume of this work there are three copper-plate engravings of Africa and the south of Asia. These are oriented with south uppermost, and coincide with those maps engraved by BERTELI which are reproduced here figg. 71, 72. The third volume contains, without counting the views of towns, maps in wood-cut of "Nova Francia", "Brasil", "Guinea", "Taprobana" (Sumatra), and finally a large map (also a wood-cut) of the New Hemisphere: *Universale della parte del mondo nuovamente ritrovata*. The last-mentioned is reproduced in this work (fig. 76), as also the map of Sumatra (fig. 73), as one of the first special maps of the large islands of Australasia.

101. (1550.) N. fig. 74. The Nancy Globe of gilded silver (Diameter half a Parisian foot or 0.162 m.). Described and reproduced by M. BLAU in *Mémoires de la Soc. royale de Nancy*, 1835. Compare WINSOR: *History of America*, III, p. 214. The outlines of the land, as will be seen from the accompanying reproduction of Blau's drawing, coincide with the outlines of Vopel's globes. Probably the "Globe doré" (No. 51) and this globe date from about the same time.

102. 1552. FA, pl. XL. A small globe map on Glareanus' projection by FRANCISCUS DEMONGENET. As regards the distribution of land it resembles the Nuremberg globe of about 1540. The northern part of the New World is called *Hyspania major*, the southern part *America*. Here may be read the Eldorado legend: "Domus tota aurea hic inventa est." In connection with the print in gores of this terrestrial globe, Demongenet published a celestial globe the same year. While the terrestrial globe is dedicated to Eximio viro D. I. P. A. Monte Majore, the celestial is dedicated to Eximio viro D. Gabrieli A. Tiesbach. A photograph of a globe-print very similar to Demongenet's of 1552, but without inscription



74. The Nancy Globe of gilded silver, from the middle of the sixteenth century. From Blau (reduced one half).

copper are known from 1500 to 1548. To those cited in FA, p. 99, footnote, I can add a map of Sicily engraved on copper by Gastaldi 1545 and a small local map of the district between Milano and Adda, entered in *Decretum super flumine Abduae reddendo navigabili Mediolanum usque* (colophon: Mediolani MDXX). The statement that Mercator's map of 1538 is a copper-print is, I believe, incorrect. Judging from the reproduction I have seen, it appears to me to be a wood-cut, which was perhaps also the case with his lost maps of Flanders and Palestine and his globe mentioned below. The only maps engraved on copper which I have seen from 1500 to 1548 are accordingly some early works by Gastaldi, the above-mentioned local-map of 1520, and Ludovicus Boulenger's undated globe-print.

98. 1550—1563. Among the many portolanos enumerated on p. 66 as still extant of CALAPODA or "Georgio Sideri dictus Calapoda", the following comprise parts, large or small, of the newly discovered countries:

a) 1550. A large map comprising the Atlantic Ocean, Europe, Africa and western Asia.

b) 1552. That portolan-atlas from the Skokloster Library which is reproduced in pl. XXV and XXVI. The map of the world is remarkable owing to the peculiar form given to the northern portion of the New World. The name America is not used by Calapoda.

c) 1563. Portolan-atlas, consisting of ten maps, of which map I comprises both hemispheres of the earth, II America, III Africa, and so on.

99. 1550. Map of the world by PIERRE DESCIELIERS (2.15 × 1.35 m.) signed "Faicte a Arques par Pierres Desceliers Pbre l'an 1550". Once belonged to Cristoforo Negri. Now at the British Museum (Add. MSS., No. 24 065).

in the title-vignette, is in my collection. In *Notice des objets exposés* etc., Paris 1889, p. 11, an undated print of a globe by the same cartographer is mentioned, and in ROSENTHAL's sale-catalogue XLII (Munich) as No. 133, a planisphere (0.263 × 0.145 m.) by Franc. Demongenet, engraved by E. Vico, Venezia, about 1541 (FA, p. 108) is offered for sale. Eneas Vico was an Italian antiquary and engraver, born about 1520, who died about 1570. Most of his works are executed between 1548 and 1560. I therefore infer that the date given is a little too early, and that the globe offered for sale is only a Venetian copy of the globe of 1552 or of its undated prototype.

103. 1552. MIZALDUS. A small picture of the land-outlines of the old hemisphere and some other geometrical figures in ANTONII MIZALDI MONLUCIANI *De Mundi Sphaera seu Cosmographia Libri tres, figuris et demonstrationibus illustrati*, Lutetiae apud Guiljelmum Cauellat, in pingui Gallina... 1552. The small geographical figures which occur here are often copies or prints from the same blocks of the figures in (APIANUS') *Cosmographiae introductio* (FA, p. 102, footnote).

104. 1553. Map of the world, "faicte à Arques par PIERRE DESCIELIERS prebtre 1553" (*Notices des objets exposés* etc., p. 17).

105. (1553.) Planisphere drawn on parchment (1.8 × 1.1 m.). A beautiful and richly illustrated Portuguese work. Dépôt de la Marine, Paris. (HARRISSE, *Cabot*, p. 238.)

106. (1553.) FA, fig. 48 and p. 94. FLORIANUS' map of the world. Antonius Florianus, according to FIORINI (*Boll. d. Soc. Geogr. Ital.* 1894, p. 349), belonged to a family of artists. He was himself a painter and architect, probably also an engraver. On Jan. 18th, 1553, he received from

If with the guidance of those maps, either printed, or drawn by hand, which are enumerated in the preceding list, we try to form an idea of the speed with which the knowledge of the new discoveries *in the Old Hemisphere* spread beyond the Iberian peninsula, we come to the conclusion that the discoveries made along the coasts of Africa were speedily known, and accepted without any protest by learned and unlearned. The minds of the public, or rather of students, had been prepared for the circumnavigation of Africa. But the knowledge of the recent discoveries along the south and east coasts of Asia spread slowly, even more slowly than that of the discoveries in the New World. While the greater part of the boundaries of the latter were fairly correctly mapped shortly after Vasco Nuñez de Balboa's discovery of the Pacific and the conquests of Cortez and Pizarro, there was, in the middle of the sixteenth century, no certain knowledge as to the form of the Indian peninsula, though it had so often been explored and described since the time of Alexander the Great.

Waldseemüller's *Tabula moderna Indiae orientalis* and *Tabula Superioris Indiae et Tartariae majoris* of 1522 (FA, figg. 62 and 63) are almost exclusively founded on Ptolemy and Marco Polo. If the author of these maps, as the describers of the gymnasium of St. Dié maintain with such enthusiasm, really had received direct information from Portugal before 1513, the information was entirely forgotten a decade later. In 1538 Mercator (FA, pl. XLIII) makes Asia, east of the Persian Gulf, end in *three* large peninsulas to the south; of these India is the smallest. Alonzo de Santa Cruz in his map of 1542 (N. T. L.) stretches the coast between Cape Comorin and the mouth of the Ganges almost due east and west; while on Honter's map of the world of 1546 (FA, pl. XLIV) no Indian peninsula is marked at all. Similar striking examples are afforded by many other maps of the first part of the sixteenth century. Cantino's map, that of Ruysch of 1508, the new maps of Southern Asia in Ptolemy 1513, the maps of Diego Ribero's type, and the small map ascribed to Leonardo Da Vinci, form praiseworthy exceptions. The reason of these gross errors in the drawing of the coasts of Asia may chiefly be ascribed to the unwillingness of the learned cosmographers to differ much from Ptolemy. Humboldt remarks justly (*Kritische Untersuchungen*, I, p. 116) that the Middle Ages believed in their own discoveries only in so far as some hint of them was given in the authors of antiquity. This opinion is fully applicable to the cartography of Africa and Asia during the first fifty years of the sixteenth

century. Whatever may have been related by trustworthy skippers and navigators, on the basis of their own experience, the learned stuck to the old representations of the earth as long as possible, and willingly returned to them after a time of doubt and disbelief. Probably the desire of the Portuguese to keep secret the charts of the Asiatic fairways as long as possible also contributed thereto. The position of the Portuguese was far too weak for them to be able to encounter with success, at the same time, the numerous aborigines, the Moors, and a rival European maritime power. Therefore it was natural that they should wish to make the country as inaccessible as possible to trade rivals. As regards the mapping of the New World by the Portuguese no such secrecy seems to have been observed, as in this case there was neither a numerous population of combatant natives nor a Moorish mercantile marine; and for a number of years these countries gave no hope of any large commercial profit; so it was not so necessary to keep the trade-routes a secret. To this perhaps is due the fact that several important charts of the American waters from the first fifty years of the sixteenth century are founded on Portuguese authorities.

A real reform in the cartography of southern and eastern Asia was first realized by the works of Gastaldi. Jacobo Gastaldi was, as I have previously stated, one of the founders of modern cartography. He was born in Piedmont, but resided and worked in Venice. Most of his maps are dated from this place. He was acquainted with Ramusio, as is proved by the dedication to Hieronimo Fracastoro of the third volume of Ramusio's *Navigazioni et Viaggi*, dated 1553. It is a natural supposition that this learned geographer and collector, of such an influential position in Venice, who had for 40 years been the secretary of the Council of Ten, had provided Gastaldi with the new material for the large maps of Africa and Asia here represented on pl. XLVI and pl. LIV—LVI. As far as is at present known, Gastaldi has not issued any equally important map of the New World. However his somewhat varying ideas as to the geographical features of this part of the world are traceable in *Universale nuovo* in the 1548 edition of Ptolemy (FA, pl. XLV), in the map of the New Hemisphere in Ramusio (N. fig. 76), and in a map of the world, drawn by Gastaldi on Bordone's oval projection, represented here fig. 77. The map of the world, divided into two hemispheres, which is reproduced in this work on a reduced scale in figg. 65 and 66, is obviously not by Gastaldi, as some investigators have supposed.

XIV.

America.

On Oct. 12th (or according to the New Style 21st) 1492, Christopher Columbus for the first time reached the shores of the New World. It is certainly the greatest discovery, and the most fruitful of results, that the history of the world has to show; nevertheless American cartography did not begin from that date. It also had its mythical period, of which the following are the chief outlines.

HOMER speaks of the stream Okeanos which flows round all the countries and by the poet (*e. g.* in the Iliad, XIV:

201) is evidently considered as forming the limits of the inhabited earth. Probably it was some Phoenician legend which was thus transcribed,¹ for in the time of the great bard the world known to the Greeks mainly consisted of the littorals and islands of the eastern Mediterranean, of Marmora, and of a part of the Black Sea. The boundaries of the known world were as yet formed in most directions not by seas, but by extensive deserts little known to the Hellenes. But the Phoenicians had probably even then examined and

¹ The name 'Ωκεανός is probably of Phoenician origin. Compare HUMBOLDT: *Kritische Untersuchungen*, I, pp. 50 and 168.
A. E. N. II.

perhaps colonized the littorals of the western Mediterranean. A few centuries later they had penetrated far beyond the Pillars of Hercules along the coasts of the ocean, Africa had been circumnavigated, and there were many reasons for supposing, that even Asia was surrounded by sea, at any rate in the south. The learned Greeks now began to consider the inhabited world as an island, surrounded by, or floating in an immense ocean. HERODOTUS distinctly states (I: 202): that the whole of that sea which the Greeks navigate, and that which is outside the Pillars, and is called the Atlantic, and the Erythrean, form one connected mass of water. This once accepted, the searching, inquisitive spirit of man soon asked whether the ocean did not surround more than one world-island. The question was answered in the affirmative, at any rate by the poets, and very soon other worlds beyond the Pillars of Hercules were dreamt of, far away in the ocean, with a milder climate and enjoying happier social conditions than this home of struggle and want which we inhabit. It was only a dream or a fancy, but a fancy in the right direction. In literature these imaginings took form and shape in the Merope-myth in THEOPOMPUS (compare AELIANUS' *Variae historiae*, III: 18) and in PLATO's account (*Timaios*: 2, 3) of the large island Atlantis, lying west of the Pillars of Hercules, which island was destroyed in a single dreadful day and night. Solon is said to be the one who first told the story in Greece, he having heard it from the Egyptian priests in Saiz. This myth, as is well known, has given a name to one of the oceans of the world, and perhaps to the richest and most beautiful group of islands therein. These fancies were given a scientific basis when the doctrine of the spherical form of the earth was advanced by Pythagoras and Plato, and proved in a satisfactory manner by Aristotle,¹ when the size of the globe had been measured with approximate correctness, and a comparison between the size of the earth and the extent of the continents we live in, had proved that our world-island only occupies a small portion of the surface of the globe. The question was now ventilated: Was that part of the globe that was unknown to us entirely covered by water, or by land and water? And was the unknown land, if such there was, accessible from our part of the world or no? Was it inhabited? And did perioeci, antipodes, or antichthones exist?

Thus in olden times much had been written about Atlantis, a continent in the western Atlantic; it had been proved that the earth was a sphere; the size of the globe had been measured; it was ascertained that the known world only occupied a small portion of the surface of the globe; there was a comprehensive atlas (Ptolemy's) founded on these suppositions; and, finally, the opinion had been expressed with a certain amount of probability, that if the provisions and water held out and the voyage was not interrupted by other con-

tinents, it would be possible to sail across the ocean from the west coast of the known world to its east coast. All this, however, was forgotten during the early Middle Ages, until the cosmographical teachings of Aristotle, probably by the intermediary of Arabian authors, were again called to life by Albertus Magnus, Roger Bacon, Cardinal d'Ailly² and others. The work of d'Ailly is remarkable as regards the history of the discovery of America, in so far as a copy still exists, which belonged to Columbus and contains marginal notes, partly written by his brother Bartholomew.

In his letters and applications to the authorities and governments, Columbus repeatedly cites these authors, chiefly to combat the prejudice existing against the doctrine of the antipodes, and in order to show that the distance across the Atlantic between Western Europe and Eastern Asia was not so deterrent as imagined. In proof of this he quoted a text in Chapter VI of the fourth (apocryphal) book of Esdras: "Upon the third day thou didst command that the waters should be gathered in the seventh part of the earth." Columbus was not very critical as regards his choice of proofs and authorities, but undoubtedly the classic, or pseudo-classic quotations he was so fond of employing had no slight influence in enabling the great dreamer finally to obtain a hearing for his plans.

A step on the way that was eventually to lead to the New World was formed by the discovery of the Canary Islands and the Azores by the Phoenicians, or the Carthaginians. As I have previously stated, these islands were visited by Iberian skippers as early as during the time of the Romans, but no persistent Carthaginian or Romano-Iberian colonies ever seem to have settled there. The discovery was forgotten by the learned, even if fishing expeditions from the coasts of the Iberian peninsula to these ocean isles never entirely ceased. At any rate these islands are marked, mostly with the names they still bear, in the old portolanos long before the time of Prince Henry the Navigator (*vide supra* p. 113); so it is not he who was their discoverer. He, however, it was who first established colonies on the Azores, the farthest west of the Atlantic islands, an enterprise in itself of immense importance in the history of navigation, since it was here that the different nations of the Mediterranean first began to undertake ocean voyages beyond all sight of land. They had certainly had precursors five hundred years previously in the Scandinavians, and in the fourteenth and fifteenth centuries those parts of the ocean traversed by the Scandinavians had been pretty carefully mapped out by them in Ptolemaic manner (the Scandico-Byzantine maps mentioned pp. 86—90 of this work, and reproduced figg. 34 and 35 as also on pl. XXXII, also Claudius Clavus' map of 1427, reproduced on fig. 36). These voyages were, however, unknown in the South during the latter part of the fifteenth century and, with the exception of those to Iceland, almost forgotten in the North. Thus it was a new practical school of ocean-navigation which was formed

¹ ARISTOTLE in the fourteenth chapter of the second book of "On the Heavens" (*Περὶ οὐρανοῦ*) says: "The earth is not only round, it is also not very large . . . The supposition that the sea of the Pillars of Hercules is connected with the sea round India is not improbable." In chapt. III of "On the Universe" (*Περὶ κόσμου*) he again says: "Probably in those parts of the globe that are our antipodes there are countries, either small or great, all unknown to us. What our islands are to the encircling sea, such is our continent as regards the Atlantic and the other unknown lands compared west with a constant easterly wind; Eratosthenes states (STRABO, I: 4) that if the width of the Atlantic did not prevent it, a ship might sail on the same parallel to India (from the Pillars of Hercules) i. e. from one side of "oikumene" to the other, and that several inhabited worlds might be found in the same zone. In SENECA'S *Quaestiones naturales* we find: "Quantum enim est quod ab ultimis littoribus Hispaniae usque ad Indos jacet? Paucissimorum dierum spatium, northern and two southern continents, of which but one is known to us and inhabited. For farther quotations from classical and mediaeval literature on this subject, I must refer to A. v. HUMBOLDT'S *Kritische Untersuchungen*. A complete account of the ocean question of antiquity, with careful references is also given by HUGO BERGER in *Geschichte der wissenschaftlichen Erdkunde der Griechen*, 4 vols., Leipzig 1887—93.

² ALBERTUS MAGNUS, Count Bollstädt died 1280, ROGER BACON 1294, and CARDINAL D'Ailly about 1422. According to HUMBOLDT (*Krit. Unters.*, I, p. 67) the first-mentioned author in his *Liber Cosmographicus* (Argentorati 1515) says: "The whole of the torrid zone is inhabitable and it is simply a prejudice to believe that our antipodes must fall off the face of the earth. The same climate is found on the other side of the equator That hemisphere which is our antipodes is not entirely covered with water, the greater part is inhabited and if people cannot come to us from these distant lands, it is because of the wide sea which separates us." "Doctor Admirabilis" ROGER BACON says in *Opus Majus* (London edition 1733, p. 184): "Quapropter tres quartas terrae, ut aestimatur," and p. 194: "Manifestum est igitur quod a fine occidentis usque ad finem Indiae supra terram erit longe plus quam medieta terrae." In the same manner and partly word for word after Bacon, does PETRUS DA ALLIACO (Pierre d'Ailly) express himself in his work *Ymago mundi*, written in 1410 and printed prior to 1487, concerning which I must refer the reader to FA, p. 38 and fig. 19.

in Portugal during the colonization of and communication with the Atlantic islands. In consequence of Columbus' lengthy sojourn in this country, it became of direct importance for the voyages of discovery across the open sea to the west. Moreover, Columbus came into direct contact with the families of the discoverers of the Azores by his marriage with Felipa Muñiz Perestrello, daughter of that Perestrello to whom Prince Henry the Navigator had granted Porto Santo. Columbus remained on this island for some time with his wife's family; it was here he became the owner of the nautical instruments and maps previously in the possession of his late father-in-

by storms to a continent, or island, to the west, is said to have reached Porto Santo in a very exhausted condition, and to have died in Columbus' home after relating his sufferings, his involuntary voyage, and the remarkable discovery it occasioned. This is said to have happened in 1484. As proved by Columbus' correspondence with Toscanelli, he had ten years previously planned his grand voyage of discovery, the aim of which, moreover, was not the discovering of new islands in the ocean, but the conquest of the ocean as a means of communication between the different parts of the world.



76. *Universale della parte del mondo nuovamente ritrovata.* From Ramusio, III, 1566. (Orig. diameter 0.264 m.)

law, which I imagine were not of great value for his discoveries to the west; and, what was doubtless of more importance, received direct information concerning those geographical or nautical traditions which existed on this ocean outpost farthest to the west. Tales were related of carved pieces of wood, and of great trunks of trees of a peculiar kind, which coming from the west had been stranded on Porto Santo; of two corpses, of unknown race, which had been found on the shores of the island of Flores; of islands which in clear weather were visible far away in the ocean, etc., etc. A sailor from Huelva, named Alonzo Sanchez, who had been driven

How much truth there was in these reports it is now difficult to decide. They were evidently circulated with the intention of depreciating the claims of Columbus. But the assumption that such tales and previous, more or less hypothetical discoveries could lessen the merit of Columbus' achievement only depends on a false idea as to the real import and essence of great discoveries. Columbus' merit does not lie in having succeeded in an important perilous enterprise undertaken without due reflection and preparation, but in his having with open, but far from hypercritical eyes, by the combination of bold cosmographical speculations, and by the study of

previous observations, come to the conviction that on the Atlantic Ocean it was possible to sail westward to unknown lands and shores; and that he, in spite of the denials and doubts of common-sense people, with an enthusiasm and perseverance that no reverses could affect, at last realized his dreams and thereby gave a new direction to the history of the world.

It must be remembered that the heretical doctrine of the spherical form of the earth was with due caution accepted by some scientific men of the Occident at the close of the fifteenth century, thanks to the Latin translations of Ptolemy's Geography and of Sacrobosco's Sphaera, but that the significance of these doctrines was not fully understood by any of the sovereigns or great men to whom Columbus applied so as to obtain the support necessary for the realization of his dreams.

A detailed account of the pre-Columbian discoveries in the western Atlantic, of which so much has been written, does not lie within the scope of this work. I have only alluded to them as an introduction to the pre-Columbian cartography of the New World.

The following maps drawn or printed before 1492 are of importance for the history of the discovery of the New World.

1. PTOLEMY'S Atlas (FA, pl. I—XXVII). Claudius Ptolemy's geographical work, having been translated into Latin in the beginning of the fifteenth century, until the latter part of the sixteenth was the chief and most widely diffused cartographical manual and the greatest authority as regards geographical questions. Several editions provided with maps were printed prior to 1492. They were doubtless often consulted both by the discoverers themselves, as also by those who equipped the expeditions. The Ptolemy map of the world, to be sure, extends only 180 degrees of longitude towards the east from Insulae Fortunatae, but the map points to the continent of Asia as continuing with undiminished width a good way more to the east. While Ptolemy with his authority confirmed the doctrine that the earth was round with a circumference amounting to about eight times the length of the Mediterranean, he left it an open question what might be the distance from the west coast of Europe to the east coast of Asia. Thus geographical speculations and dreams in d'Ailly's style (compare FA, p. 38) here found ample play.

2. The Scandico-Byzantine maps (FA, pl. XXX and figg. 33—36; N. pl. XXXII and figg. 34, 35). I have previously on page 86 given a full description of these maps, from the thirteenth or beginning of the fourteenth century. I will now simply call attention once more to the fact that, at least a hundred years previous to Columbus' discovery, there was an American land depicted on them, viz: Greenland, and that this country is more correctly mapped on them than Britain and Scandinavia on the maps from the beginning of the sixteenth century. In this group we must include the map of Zeno published by Marcolini at Venice in 1558, if it is really founded on an original which existed prior to Columbus.

3. A map in PIERRE D'AILLY'S *Ymago mundi*, finished 1410, printed 1483 (FA, fig. 19). Extremely rudimentary, but important since Columbus is known to have possessed this work. The superscription of the map contains the following lines which shed light on the hydrographical theories of Columbus: "Mare vero rubrum exit ab oceano . . . versus meridiem circa medium orientis et occidentis, a cujus litore vix in anno terminus indici oceani navigatione attingitur." If the distance from Gades to the Red Sea, as is indicated on d'Ailly's map, was a fourth part of the circumference of the globe, counted in meridians, and it took a whole year to sail from the coast of the Red Sea to the utmost limits of India, there was not much left for the distance across the ocean from India to Gades.

¹ This name has been translated by Humboldt and others as "Satan's Hand". This is probably incorrect. I suppose the legend should read: y:a de Man St. Anastasio.

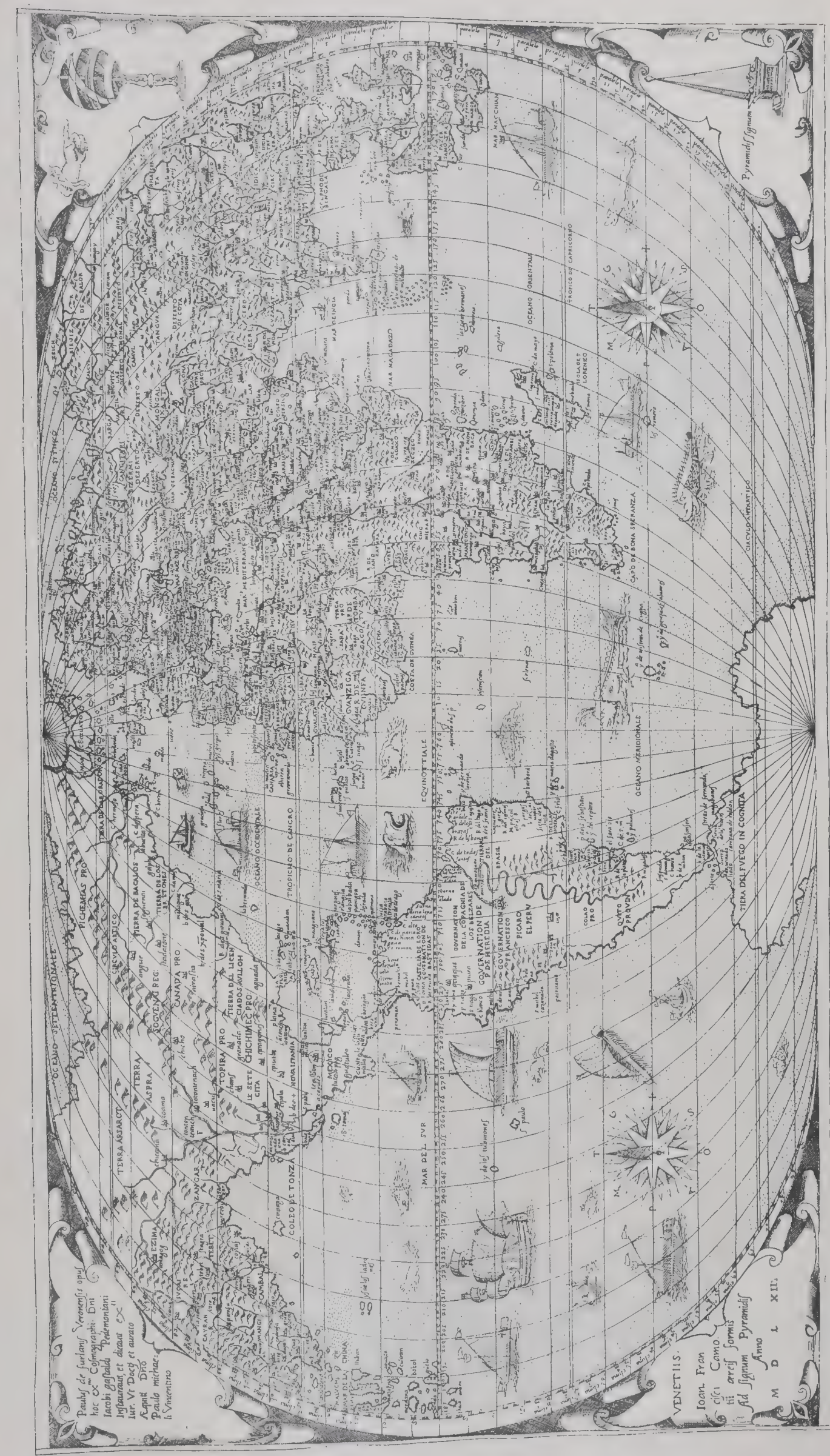
4. Map of the North of 1427 by the Danish geographer CLAUDIUS CLAVUS (FA, fig. 27; N. fig. 36). A more particular account is given of this map in FA, p. 54 and above on p. 90. I enter it here because Greenland is marked thereon.

5. Portolanos from the fourteenth and fifteenth centuries, embracing not only the Canaries, Madeira, the Azores, but also some fabulous islands in the Atlantic, viz:

A) *Insula de Brasil*, lying in the Atlantic Ocean west of Ireland, about the latitude of Limerick. Often the circumference of the island is drawn as with a pair of compasses. Sometimes the circle is toothed like a saw. On the Catalan atlas of 1375, as also on a Catalan map from the fifteenth century, now at the library of Naples, reproduced in KRETSCHMER, pl. IV no. 8, the interior of the island is represented as occupied by a large circular lake containing seven isles, a reminiscence of the legend, also cited on Behaim's globe, of the island in the Atlantic ocean with seven towns (septe citade). In some maps, e.g. the Catalan planisphere from the fifteenth century in the Ambrosiana (*Bidrag till Nordens äldsta kartografi*, pl. V), Matheus Prunes' portolano of 1553 (KRETSCHMER, pl. IV), Bartolomeo Olives' portolano of 1584, a portolano by Prunes of 1586 (both reproduced in *Bidrag till Nordens äldsta kartografi*, pl. VII, and VIII), the island is drawn as a double island, divided in two by a narrow strait. In other maps (Pinelli's and Combitis' portolanos, Benincasa 1467, Freducci 1497, Calapoda 1552) there is in the centre of the island a narrow parallelogram which bears the name *Montorius* (or *Monte orius*). The designation *Brasil* is omitted on some of these maps. The first map on which I have seen marked "insula de Brazil" (the orthography varies somewhat) is Dulcert's portolano of 1339; it is afterwards met with on most portolanos embracing that part of the ocean where these islands are supposed to be, until the end of the sixteenth century. The island reappears still later on printed Dutch charts, e.g. on the Wagheners, on the *Nieuwe Pascaerte van alle de Zeecusten van geheel Europa* etc. Gedrukt t'Amstelredam bij Ian Everss. Cloppenb. 1621, beautifully engraved and printed on vellum, etc., etc. A supposed rock in the ocean, west of Ireland, retains this name on charts of a far later date. In some portolanos the name "Insula de Brazil" occurs also among the Azores.

B) South of this island and farther from the land, first on the Catalan atlas of 1375, and afterwards on most of the later portolanos which embrace the northern part of the Atlantic, is a crescent-shaped island, designated by the name: *insula de mam*, *y:a de laman satanaxio* (Andrea Bianco 1436), *isola de man* (Benincasa 1467), *illa de mayde* (Prunes 1553). This island, on the portolanos I have seen, is easily recognized by its crescent form. It is usually designated by variations of the above name. A totally different appellation (*Fonzele*) occurs on Pinelli's portolano of 1384 (N. T. XV) and on Combitis' portolano from the fifteenth century.

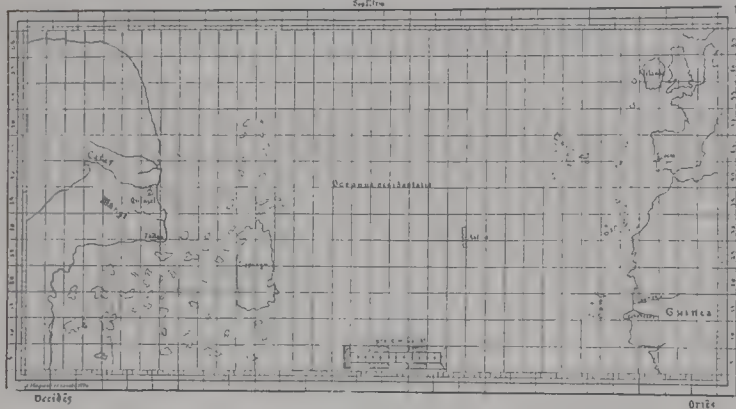
C) *Antillia*. On an anonymous map at Weimar dated 1424 (HUMBOLDT'S *Kritische Untersuch.*, I, p. 416), on Becharius' portolanos of 1426 and 1435, as also on Andrea Bianco's map of 1436, south of y:a de Mam there is a large island in form like a parallelogram, with its greatest extension about due north and south. It is called *Antillia* (compare N. T. XX). On Bartolomeo Pareto's planisphere of 1455 (pl. V in KRETSCHMER) an island of similar shape and name occurs, as also another island called *Roillo*, situated east of Antillia. On Andrea and Gratiotus Benincasa's maps of 1476 and 1482 we find the parallelogram island with several legends along its shores; and on the last-mentioned map, a little farther north, there is moreover an almost similarly shaped island, *Saluaga*, with five legends.



77. Map of the world by Gastaldi, 1562. (Orig. size 0.532 X 0.29 m.)

On Behaim's globe neither Insula Brasil nor Insula Mam is mentioned, but "Insula antilia genant Septe citade" is here placed south of the tropics, and there is the following inscription beneath it: "als man zelt nach christi gepurt 734 Jar als ganz hispania von den heiden aus affrica gewonen wurd do wurd bewont di obgeschriben Jnsula antilia genant Septe citade von einem erzbischoff von porto portigal mit sechs andern bischoffen und andern christen man und frawen di zu schiff von hispania dar geflohen kōmen mit jrem vieh hab und gut anno 1414 ist ein schiff aus hispania vngefert darbei gewest am negsten."

D) *St. Brandan*. South of the Antilles close to the Equator there is on Behaim's globe another large island with the inscription "nach christi gepurt 565 Jar kam Sand brandan mit sein Schiff auf dise Jnsel der doselbst vil wonders besah und der über siben Jar darnach wider in sein landt zog." This is a reminiscence of a geographical myth which is deduced from the pious legends of the wanderings of an Irish saint among the islands of the Atlantic during the sixth century of the Christian era.¹ The same island appears off the coast of Africa in Haldingham's map of the world of the thirteenth century (N. fig. 5), but is found neither on Dulcert's map of 1339 nor in the Catalan Atlas of 1375. It is however entered in Soler's Catalan portolanos of 1380 and 1385 (vid. p. 114) as also in Jacobus Giroldis' and Battista Becharius'



78. H. Wagners reconstruction of TOSCANELLI'S map. (Reduc. 1/3.)

portolanos of 1426.² These portolanos give us a representation of the idea formed by practical mariners of the distribution of land in the Atlantic Ocean during the fourteenth and fifteenth centuries, and, if they are any criterion, all knowledge of that part of the ocean we are now speaking of must have remained almost entirely stationary for a whole century before Columbus; — an indisputable proof of the very slight influence those voyages had upon the development of geography. But it should be remembered that it was the aim of Columbus not to discover new islands in the ocean, but to open up a new and shorter mercantile route from Europe to China, a route as yet monopolised by no maritime power in Europe, further that there were cartographic drawings before 1492 which considerably aided Columbus' endeavours to obtain the necessary means for realizing his plans. Such pre-Columbian geographical works were:

6. BEHAIM'S globe, and

¹ A more detailed description of the St. Brandan (or Brandon) legend from a geographical point of view is given by Humboldt, d'Avezac, Peschel, etc. The legend is illustrated in all pious simplicity by the Benedictine monk HONORIUS PHILOPONUS in his *Nova typis transacta navigatio Novi Orbis* etc., s. l. 1621.

² To these mythical islands there were in the middle of the sixteenth century added Drogeo, Estotiland, Frisland, Icaria, etc. These were first entered on the map of the North (FA, fig. 29) by the brothers Zeno, printed in Venice 1558 with a statement that it was a slightly revised copy of a chart dating from the close of the 14th century. For a century this map exercised vast influence on the cartography of the north part of the Atlantic. Later it gave rise to an extensive literature for which I may refer to *Facsimile-Atlas* p. 57.

7. PAULO TOSCANELLI'S map.

The former (vide p. 128) gives us a representation of a learned mariner's idea of the distribution of land on the globe; the latter proves what a celebrated and unbiassed scientist thought of the distance between the west coast of Europe and the east coast of Asia.

Paulo Toscanelli was born at Florence in 1397, and died there in 1482. He was a well-read man, a clever mathematician, astronomer, and cosmographer. Columbus learned while in Lisbon that king Alphonso V had ordered the Canon (afterwards Cardinal) Fernando Martinez to ask Toscanelli for a full statement concerning the possibility of reaching India by the western route as Columbus had proposed. Toscanelli's reply was dated June 25th, 1474, and in it he says: "I can demonstrate the matter in question with a globe; but I prefer to mark out the route on a map resembling a chart, on which I have myself drawn the extreme western boundary from Ireland to the further border of Guinea in the South with all the adjacent islands. Opposite Ireland and Africa, due west, I have placed India, with the islands and places where a landing may be effected. The map I send you for the King shows the entire distance between the East (i. e. Ireland and the Guinea coast) and the beginning of India. You must not be surprised that I call the Land of Spices the Western country, for those who sail continually towards the west, when proceeding in this direction, will meet with the same lands as those who go by land towards the East."

Later Columbus himself opened a correspondence with Toscanelli, by the assistance of a Venetian merchant in Lisbon, Giraldi. There are two undated letters extant of this correspondence, both from the pen of the aged Toscanelli, and in these he approves of Columbus' plans, to try to open up a new westerly maritime route to India. The map sent by Toscanelli to Alphonso V is mentioned by Las Casas, but it has disappeared since. Its re-appearance would naturally be of vast interest in the history of the discovery of America. Many attempts have been made to reconstruct the map, latterly with great erudition and critical acumen, by HERMAN WAGNER (*Die Rekonstruktion der Toscanelli-Karte v. J. 1474 und die Pseudo-Facsimilia des Behaim-Globus v. J. 1492; Nachrichten der K. Gesellsch. d. Wissensch. zu Göttingen* 1894). It is this reconstruction that is shown in fig. 78.

An account of the history of the discoveries made in America after 1492 is not within the scope of this work, nor, thanks to the very extensive literature on the subject, is it necessary. Here I am compelled to confine myself to a list of the legends along the coast of the New World on some of the most complete maps from the first fifty years of the sixteenth century, to an enumeration of the oldest printed or hand-made maps that in one way or another are connected with the New World and the history of its discovery, as also to a reproduction of the most important which have been obtainable and are of a size which allows of their reproduction in this work.

Legends on maps of America 1527–1546.

Anon. 1527. ¹	Alonso de Santa Cruz 1542. ²	Sebastian Cabot 1544. ³	Pierre Desceliers 1546. ⁴	Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
I. <i>The east coast of North America.</i>				B. Newfoundland and surrounding islands.			
A. Labrador.							
TIERA DEL LABRA- DOR	TIERRA DEL LA- BRADOR		LA TERRE DV LA- BOUVREUR C: coramello Baye pellado C: desperances C: de dena farme y:e dorbelande C: des Loups ma- rins C: de nord prayrie B: Ronde G:o petit B: Ronde B: des basses	y: de la fortuna [ya de la tormen- ta] ⁵ C: del marco S. p:o [S. Juan] y: delos saualos C: hermosso b: delas gamas y: del fuego ysleos delas aues C: de marco y: de freilius [b. de S. ciria] y:a delos bacallaos C: de buenaven- tura C: de la spera R: delas patas C: Rasso C. destiago C. de S. palos		y:a de dimonios c:o de gamas baya de ososblan- cos y:a de pinas y:a de aracifes y:a de fuego 2. monte xpo 3. y:a de freilius 4. baya de cotebi 5. pillana rion 6. y: de bacallos 1. buena uentura baya te s: m: c: despera cauo rasa anca monte xpo de s: maria onsemel yogines	y:e de fortune S:t pierre S:t Jehan bellisle mont detrigo medons y:e de freilius B: de S:a hatherine bacalliau B: de conception Cap fremofe C: des poir R: de patas C: de Raz B: de S:e marie B: S:t andre C: caramello Y:e Verde ..im Vierges y:e S:e anne C: Real
		rio nouado g:o baxo rio de baches C:o de manuel pi- nol C: de los baros baya de los santes baya de syieras terra de riuspranus g:o de plarel g:o de branda g:o de maluas rio duce	R: S:o Playne T: de terre ferme R: de bone viste Cap p:o 4. R: de Seria ⁵ 1. C: des basses 2. G: du pcel 3. G: de fa Vañz G: de touslessainetz R: Grande R: dollagna Conisscada G: de Vsgo R: Longue Les chasteaux		y. baxa C. de s. maria C. de s. m[ar]co? y. de S. elmo		

¹ According to a photograph of the original at Weimar.

² According to list of names in DAYLOR's work, already cited, compared with the original at the Royal Library, Stockholm.

³ According to JOMARD's reproduction. Mr. G. Marcel has kindly carefully corrected the proofs by comparison with the original in the Bibliothèque Nationale in Paris. He says on this subject: "Les corrections que vous me demandez ont été faites avec le plus grand soin. Il s'ensuit que l'original est absolument fautif. Cabot a fait sa carte sur des portulans que son graveur n'a pas su lire, car à chaque instant on divine ce que devait porter l'original."

4 "Mappemonde de Henri II". From JOMARD's reproduction.

5 The figures before the names signify that the order of sequence has been altered.

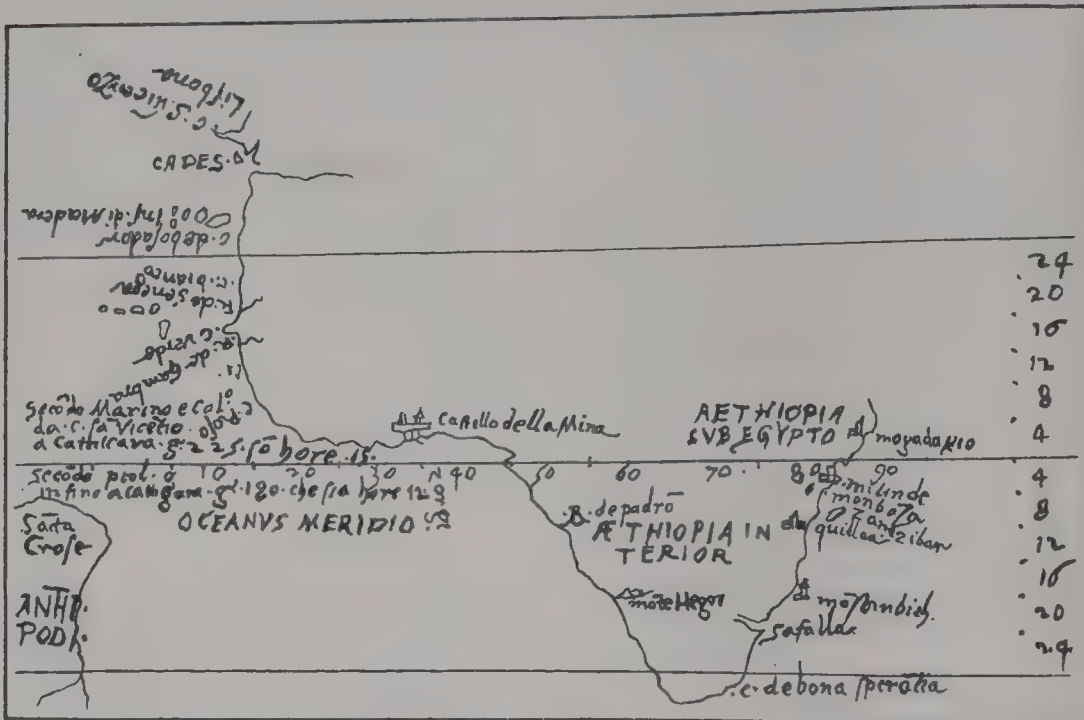
⁶ The names in brackets are taken from DIEGO RIBERO's map of 1529.

Anon. 1527.	Alonzo de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
Archipielago [ya: de Juan estevez]	ya: de Juan steves	s: cruz de Juanlnos(!) del berton	coullon bier Les granges ye de Jhan estienne ye du breton encorporada Adonda

C. St. Lawrence river.

c:o del gado del-	le butes
marro	
atelabara	Jhan James
breste	blanc Sablon
breste	ys lotes
	R: Sablon
	blanc
	R: cartier
	R: damont
todoyslas	tontys
c:o deltronot	C: tremet
y:a detronot	S:t nicollas
salinas	S:t Laurens

Anon. 1527.	Alonzo de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
		elestrecho luagodoma galosme golesme la agade estadas tuttonaer pora quinope de- pasar	mont de proy ys dangoulesme Terre Jacob Sault Le pūnes Sit malo chasteaubriant languille R: p:o Canada
		ys: de s: Juan ongedo baya de ralegno c:o delmaro rio de paris saluayos	R: de memoranty de Voille Ony gnedo C: de prey S:t martin Sauluages La bastille Terre de michalma

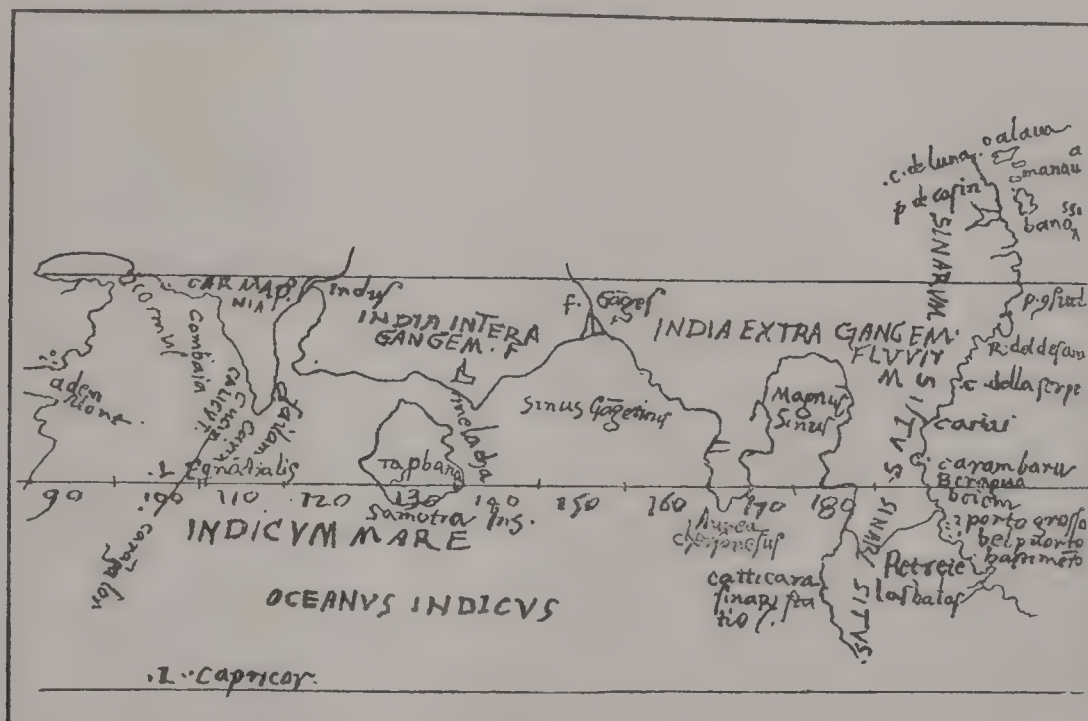


80. Sketch map by BARTHOLOMAEUS COLUMBUS (1503), II. From Wieser. (Orig. size.)

munuias	G:o p:o R: millas mille						C: despoir C: Somā Baye de S:ie marie C: dangoulesme R: des barques Assumption alezay y:ie b:rien y:ie aux margaulx
ysleospinto rio duce	R: de cheuaulx R: douce			C. grueso R. de dos bocas			
baya des loreme							
ysleos	Sept ys					y:a de s: Juan	
saqui	Sit Jacques						
rio de s: quenain	les banxz						y:ie b:rien
baya delos isleus	Terre de lionot Canada						y:ie aux margaulx
y:a de arbiuas							
serrones	R: Grande R: du Saqnay y:ie de couldre Aqchemida Stadiu	Tierra delos bre- tones		tierra de bretones		primatierra iusta prima uista	TERRE DES BRE- TONS
esla da cones	Sie + franciroy A de genoada Ochelaga	[C. del breton]		c. breton S. Juan canal de S. julian R. grande C. de la vuelta			Sit paul Sit pierre C: aux bretons Coste B: petite R: fremose
rio fones	R: de fonez	de la buelta				p:a formoso	
							Sit michel

Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
[anco de y:as]	b. de la ensenada	baya pequegna	Ansses B: des ys P: agnada Pangno R: paleta Coste de ble R: de Volte Les coudes C: dansse Les montaignes
[R. de arboledas]	R. del castanar	cro stadabida rio dabol cacomedas	R: du noroest R: darbres R: fine C: de longue Coste droiete R: de + Gomiz caierirus Coste de dieu
[R. de montanas] golfo [arboledas]	c. de montanns golfo	montagnas rio fondo rio daruo costa desierta rio de peros costa de donmarti aracife	les medanos C: des isles Anorobagra
[medanos]	costa de medanas	los medanos baya fernosa montagnas	

Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
b: de s. antonio			B: de S:t anthoine R: de bōne Viste ys des Loups R: de S:t anthoine G: de S:t x̄posie R: de la tournee C: des Sablons G: de tournee Les picz G: de G:o C: de labry S:t Jacques Coste blanc
b: de s. xpoual	R. de S. antonio b. de s. xl(cristóval)	rio de s: antonio baya de s: xpōual	R: de medano C: S:t Jhan R: des caues Les playnes B: de S:e marie
[R. de stiago]	b. de s. tiago c. de s. tiago C. de las arenas C. de S. juan R. salado	baya de s: tiago 3. de las arenas 1. c: de s: Juan	
C: de arenas p: de s. Juhan			
[playa] [b. de S. m:ce]		2. baya de s: ma: canao baya de s: espirito	R: du S:t esprit Lansse
[R. del espu. s] tierra del licenci- ado ayllon	R. del spiritu santo c. de Resalga		
[C. traffulgar]			S:t michel



81. Sketch map by BARTHOLOMAEUS COLUMBUS (1503), III. From Wieser. (Orig. size.)

		rio de buena madre				Coste des matas
		rio de s: anton		[R. del principe]		R: du prince
		rio de s: xpoñal		aguda	R. de baxo	Playne
	R. de los gamos	rio luengo		[R. de sucia]		R: Seche
		palmar		[R. de coñas]	c. de canoas	R: des Canoes
C: de muchas islas	C. de muchas isl.	cio de muchas ys.	C: des ys	[C. de ss roman]	2. C. de s. Roman	C: Stt Romain
		baya de s: maria				Cofte droiete
[arcipielago de esteuan gomez]	arcipielago	arcipelago	Arcepel de estienne gomez	[R. Jordan]	1. R. jordan	R: iordan
			La playne	[playa]		Les playnes
			harbues	[S. elena]		R: de la baye
montanas			montaignes	[C. de s. elena]		C: Sie helene
	C. de arracifes	capo de aracife	Les ys		C. de +	Les ansses
		rio sero	Rontra			P: e braue
		cesta altari	Coste	[C. grueslo]		C. gonesco
			Les germaines	[R. solo]		R. Seulle
s: Juhan baptista	R. de S. Juan bautista	baya de s: Juan batista	Baye de Stt Jhan baptiste	[mar baxa]	R. de rincon	mer basse
			Les montaignes			Gofante merosto
			Les escorey			R: des palmes
R: de buena madre	R. de buena madre	rio de buena madre	R: de böne mere			C: des courantes
	C. de s. pedro					C: du mont
montana verde	montanas	montagnas	m: Verde	labermuda	la bermuda	C: de gariao
						R: de parcal
						La bermude

A. E. N. II.

43

Anon. 1527.	Alonzo de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
E. Florida to the Isthmus of Panama.			
LA FLORIDA martires tortugas R: de scapana R: de la paz R: de canoas [R: esta para] b: de Juhanponce [atalaya] ancon baxo las matas [R: de concibicion] R: de s. Juhan costa tesa [C. de farallones] dende aqin desco- brio fro de garay R: de nieves Reciffes [p. de baxas] R: de flores el canaueral p: llana aldea medanos motas de s. salua- dor ancones marpequena [Ostial] R: del spiritu sancto [C. sirio] [ira de gigantes] C: de + p: de arreciffes [p. baxa] R: del oro R: scondido [anegadas] la madalena [C. brauo] las palmas montanas arboledas mon- tanas R: de montanas altas R: hermosso arenas R: de s. benito	LAFLOIDA martires tortugas b. honda ancon baxo b. de miruelo b. de los baxos R. de las baxas arenal b. de nieves arracifes R. de flores matas del salvador culata mar pequena R. del spiritu santo C. de + plazel C. desierto R. de montañas R. del oro R. de pescadores R. de la madalena C. bravo R. de palmas	LA FLORIDA martiles tortugos rio de lapan rio de canoas baya de Juan ponte farallones baya honda ancombaro de san barco pan- flo denarnaez baya de miruelo aqui baya de arenas playa arenal rio de nieues aracifes rio de flores matas mantas del salua- dor culata marpequgna rio del spiritu santo c: de s: cruz angla baxa c: desierto rio de montagnas rio doloro palmar rio depescado la madalena rio de pescadores c: prano palma costa de arboleda rio solo montagnas altas del gada playa rio de palmas rio de montagnas rio femoso	LA FLORIDE Les martirs tortues mar de bone paix B: de Jhan ponce crola castle gouuerner St: marcou Ascencion R: Verde C: escondido Pe: de Jhan de la nef R: des neiges R: des anges Coste de fleurs Po: honde R: de gato Le cauchanecal pte playne R: demedano Les motes de Sau- lueur mar petite Les matos Ostial R: de St: esprit C: de + C: descuerto R: de lore R: des pescheurs Ancifes mallabry R: de la magdalene Coste terra C: brauc Le pcel Playnes forestz montaignes R: des palmes R: des Vierges St: bracist R: . . boro

Anon. 1527.	Alonzo de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
canate marato R: panuco loatom yas de lobos [c. roxo] [playa] [C. de cacones] [S. p: . . s. paio] R: de almeria villa rica R: de. s. xpounal [R. de canoas] R: salado R: de s. Juhan yas de sacreficios 2. R: de vanderas 1. R: del comendador aluarado R: de perdicion sierras g: de. s. anton R: de gasacalcos R: de s. blas R: de la balsa R: de las palmas R: de 2 bocas [R: de grisallua] R: de. s. pablo termino p: de seado IVCATAN [R. de stiago] [S: alma] p: llana R. de g . . . R: de la gotoche [R. de xpianos] higueras C: de higueras [Anconas] de nauidad C: de 3 puntas a: de cauallos [R. de pechi]	R. de panuco tierra de pavos C. Raso R. de s. pedro y s. pablo 2. villarica 1. la vera + S. Juan delua R. de banderas R. de alvarado R. negro R. de dos bocas R. de grixalba boca de tierras IVCATAN R. de la gartos cotoche g. de la yegueras C. de 3 puntas p. de caballos	rio de panuco ya delobos c: roxo rio de tuspa anra de cacones rio de s: p: y: s: pablo tierra llana rio dal moria tolera blanca playa uillarica lanuera cruz s: Juan de lua rio deuenderas p: del gada rio deguraquelco rio dez bocqos rio de grisallua s: pablo Terminos c: redodo rio de lagartoi baxa de tom p: a steril cotoche baya de la conce- bricion rio grande rio baxo c: deigueras c: o de 3 puntas digueste p: a de cauallos	paons R: des paons C. R: de tuspe G: de cagona St: pierre et S: paul Terre plate Almerye Villesriche La Vraye + R: St: Jehan de lux R: de Vanderas Pe: de la guada R: de alneredo medanos de Sa- blons C: noir y: e caparato m: St: martin catco R: de gnacy La Rambla R: de palmes R: de bocas R: Grytallua R: St: paul terminos G: teste poton chan lusare La palea guerre La desco medanos Ansces Constance R: de la gartos Atallaya B de couill Pe: des ba C: de corоче pe: des fent . . es Lene La magda B: conception C: de gerro R: Grande P: des figeras G: doulx C: uiples R: lo Tequeceste P: des cheuaulx R: de peche

Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
	trihonfo de la +	trionfo de la cruz	Ansse Triunphe de + montaigne
[R. de perdidos] la fondura rescate	C. de honduras	rio delos perdidos	R: des perdus fondures
p: de arrecifes mar de la tierra s: thome cartago ar tan	C. del camaron	rio grande cauo decamaron p: delos aracifes p: delos baxos	R: Grande C: camaroa P: des Ansses p: e S: e (?)
playa	cartago	cartago xines pideca p: real aruolea	cart . .
C: de gracias adios	C. de gracias a dios	c: gratiua doros LACUNA DE NI- CAXAGOE costa desyerda	C. graces adieu
cariay p: blanca [ys de areba] alden	cerenaro	cariay p: blanca arabaca	marmora
beragua arboleda	veragua veragua	beragua sagardos p: ualo eloscudo	Varagna quiboa chepla R: de chagre p: o liell de bastimento nombre de dies R: francoise P: e de catiua G: S: t blaise R: Sauabre
[guanaxa] nobre(?)	belen	y: a de bastimedo mombrededias	Acla Caretu darien
[comogre]	nombre de dios	y: a de catiua	
acara	acla	ada rio de feon	
darien	carie	carie	

2. West Indies.

A. Bahama Islands.

jardim		binimi	Rôqs
tierra de bimini		binimi	mimeue
bahama	bahama	bahama	bahame
cabocos	abacoa		
el lucayo grande	yucaiones	yucayoneque	Venayoneque
cigateo	cigateo	riguateo	Cignatno
curaceo		guateo	
guanima		g: o vamina samana	Guanima Saniaua yeema Xamete
huno	yuma yamelo triangulo	cameta triangula	
guanahan		maraguana	Gnanahani magnana
manigua			
mayagon		yubaque	
yabeque	ynagua	magua	
ynagua			
mayaguano			
cayacos	caicos	canos	Caycos
yucancan		amana	Amama
		quuna	
amuana	aruana	amuana	Aumana
baxos de babueca	ba. de babueca	baxos de abroyo	Abreoto

B. Islands off the coast of Central America.

[Zarca]	sarca	lazarca	Zarca
triangulo	triangulo	triangulo	Triangue
	de arenas	y: a de arenas	de Sablons

Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
	la bermeja	lebermeyas y: negras alacrances	La be . . . ota margias Alacrans
alacrances [amazones] y: de mujeres coçumel [cayes] y: llana todos sanctos sancta fe s: francisco	alacrances	y: a de mugeres corzumel quita suegno llana todos stons s: francisco	Cozumella
		laseranica	S: e anne Serranilla quitacyeuo nouador
la serrana	la serrana	romadar lozerana saspipudes vinosas sanlandores s: catalina	La Serrane
s. andres [s: catalina]	s. andres s. catalina		S: t andre S: e hatherine

C. Greater Antilles and adjacent islands.

a. Cuba.

CUBA	CUBA	auana	La hauane
		ma: rien	B: honde de maryen Les orgies
C: de s. anton	c. de s. anton	c: de s: Anton c: decorientes guni guanico y: a de pinos xagua latrenidad	C: de S: t anthoine C: de courantes Guanico y: e de pras xagua trinite porcall donasco can Guguba maneti
y: de pinos			C: de + duperc boycar S . . . rt Bocas de boni
[Jardin]			
C: de +		c: +	
S: tiago			
p: o de palmas [p: o desul] [p. escon] p: de mayci		p: depalmas	p: escond . . . P: e de maycy
p: de yuca nacan		c: de mani barasoa ormigas cubuacan guabana	qubanacan
		cacos matama chipiona	P: du prince P: deycocos matan .. bipione careñes

b. Jamaica.

y: as de la gartos	caimanes	canuanas grillo	Cayman Grande Caymānes
Jamaica	Jamaica	p: delme c: falcon biuoras ermo deJuan del camaya	oristan byuoras formys Caguay P: e de morante Reues
biuoras		p: de anton melilla feuilla	

Anon. 1527.	Alonzo de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
c. Haiti.			
SPANOLA [HAITI] nauaca [C. del tiburón] yabaque	SPAÑOLA c. del tiburón	nauara c: del tiburón yabaque	nauasa C: del tiburón yabaque Sallana balques C: ya q..... freres C de le mōnā La beate mulea p. huica p: micyo S: del tiburón p: de cazado G. de Sani... C: de St Raphael S: le latherine (!) Saona mona c: de sengagno higuy C. de Cabron p: plate moyuion Martinal y la bella mont xpl p: Re.... escollas C: de... paradis
la beata		ya Jues alto uelo la beata	
s: domingo	s. domingo	p: a fermoso s: domingo p: a de caizado	
saona lamona		catalina la saona mona c: de sengagno	
[C. de higuio]		g: de samana	
[p: de S. nicolas] guanabo		torniga c: s: nicolas guanobo amito	S: del tiburón S: nicolas
d. Portorico.			
p: o Rico		p: a uico eleguada zecheo c: roxo inferno beyeque luquillo	port Rico Aguada Zecheo C: Roxa beyeque de luquillo
s. Juan S: +	San Juan S. +	santa + palaye	S: e +
Virgines anegada	virgines anegada	virgines anegados	Virges Aneguada
D. Lesser Antilles.			
el sombrero el anguila	sonbrero	sambrero languilla s: martin s: bartholome estatia saba s: xpoual nieues redonda ya de aues monserate baruada antigua guadalupe desenda marigalante todos stons dominia matiuino s: luzia barbudos	Sombrero S: del tiburón S: xpofle neiges Ronde des oyseaulx Monceresse barnada Guadalupo dominica matinina S: e Luce barbues

Anon. 1527.	Alonzo de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
los monjes aruba curasnote	s. viceinte aruba boinare y. de aves	s: vicente ya de s: bernaldo mouyes aruba curaçao boinari laroca de aues tatuga qubagua de orchilla	S: t Vincent y: e de S: t bernard moynes Araba quracayo boynaic Roche des oyseaux Roqs tortue qubague
la Roca de aues delos Roques			
cubagua	orchilla		
potegari		y: a blanca la margarita	La blanche la marguerite freres
margarita	margarita	oche	
[coche] [starles] testigos		testigo	tesmenigz
la granada tabago	granada tabago	la granada tabage p: a de la gabera latrenidad	Cabague p: e de la Gallee parya
[la trinidad]	La trinidad		

The north and east coast of South America.

A. The Isthmus of Panama to Cape S. Agostinho.

p: hermosso dabaybe vraba caribana [cenu] alde de resgate	uraba c. caribana(?)	culna p: de carugna resgate	Vraba carybana tortue Resgate R: de gerra y: e forte Caparato Cenu balleylas baru S: t bernard p: de naos
	R. del oro	carapato rio descenu	
[baru]		terruga de baru de s: bernaldo p: denaos curuigima p: de zambra	
cartajena	cartajena		Cartagenes
la canoa		mare fermosa	p: e de la Canoe Sablons
p: o de zanba tierra llana alde grande		salmedina de arenas	zenba matra R: Grande
	R. grande	rio grande Neyua cienegu los dicos s: maria c: de laguya concha	Synaga
s: marta	4. S. marta 1. C. del aguja 2. concha		S: e marthe C: de langente Concha Ansses Anse de gnachilo
gochire tucuraca	3. tucuraca	3. gochete 1. tucuraca 2. p: de la cramada ipirapueblo	
	R. salado puerta delarada seturna	seturna	R: de Palonunos La Ramade R: de la hache C: la Velse C: de la Voille portet p: honde Coquibacon LE LAC C: de Venancielle
[vrua]			
C: lauela	c. lauela	c: lauela lago	
coquibacon		c: o chibaos bagotian	

Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546	Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
C: de s. Roman coro sauca p: seca	c. de S. Roman	c: de s: roman	C: de S:t Romanisto Goro ys: de tricaca	tierra llana p. baxa R: de la barca		tierrallana	Terre Playne
	g. triste p. flechado	p:as sera curiana ge trista p:ia flochado	G: tr.... p: flochado	areciffes	R. salido R. verde R. salado	rio della barca playa rio de placel rio de las amazonas rio uerde	R: de la barque
de pescadores p:o muerto	R. oinare	c:o deileo blanco c:o delacodera	p:ie moro C: de forillon blanc C: la chandiere higeroto R: de Vuary				R: Salee R: Verde Palinar R: de bien R: des oyseaux R: de Vincent R: du cacique C: des basses R: de mniho R: des basses mallabry
higueroto boynari [de coronas] monte alto perito portogaleta macarapana chiribeché	c. delacodera	perito	ys: de perito	arboledas	R. baxo	playa rio baxo	R: de prael
	maracapana	maracapana chichiribichi	maracapana Cherebice	R: baxo aldea C: [b]lanco			



82. Map of the world by GLAREANUS, 1510. From A. Elter (some legends excluded). Orig. size 0.227 x 0.227 m.

boynari	S. fe	santafe	S:ie foy				R: de fumees
cuman	R. cumana	cumana	R: de armana				C: de la tournee
p: daraya	p. de araja	araya	de araja				Ansse
C:		playa culatago	G: cariaico				R: de mal
	c. de 3 puntas	de puntas	C: de Salinas	furna		alacaqueina	Atalaca
aldea	aldea	2. aldea	2. Aldea R.	2. R: baxo		furna	R: fresche
furna	caribes	1. caribes		1. montanas		montagnas	C: des basses
camari		rio demeta	1. decamary	R: de la buelta			Anegadus
	R. de paria	rio de huy apari	pary	aldea			montaignes
anegados			R: de ama	furnagrade	R. de arracife	rio de unnenanes	Coste descenuerte
palmar	c. Raso	riraso	p:ie enneguada	C: blanco	R. de arazifes	c: blanco	B: de S:t Jhan
R: salado			C: Raso	costa de lajas			Baye de Lislet
R: de canoas		rio decanoa	C: noes	arboleda		rio de aracife	Coste caia
[monte peloso]				R: de pascua		arboleda	C: des basses
monte aspeso				visto delexos		rio de pesca	R: de S:t michel
		rio desala		costa de paricura			B: de drogolerte
R: dulce	R. dulce	rio duce	R: doulce		R. desclavos	rio de los esclavos	R: S:t paul
A. E. N. II.							P: de prael
							R: de famus
							pinate

Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
Maranhom R: de la trinidad	R. marañon b. de todos santos b. de Juan de lisboa c. de corrientes p: a de fuegos c. de loeste 3. b. del plazel	maragnon rio de los esela baya de todos santos c. de fumos rio de Juan de lisbona rio segundo rio de nabar decorientes 2. rio del plarel	Tabaiarres Aronquis marignan Tapicoru Abuimham IR: mon R: de Jhan de Lisbone R: danobon R: de deulx bras Coste blanche R: de courone Coste de Loest R: Grande R: de parcel R: de troys bras R: des basses Terre de pescherie B: des pees
C: de lo este C: del monte			
calera furna	1. tierra de s. vicente 2. tierra de humos	1. teirra baxa baya de fumos p: a del parmar primera agunda	
a: de la aguada R: de vicenteanes pinzon C: negro			Anse des negres m. de ely m. fremose p: e prata B: St lucas
b: apracelada		s: lucas anglada c: corco	montaignes de St michel B: des taita... gas
a: de la aguada			
[arecifes]	C. del palmar p: a primera c. blanco	sicras de palmar c: primero	p: e premiere
b: hermosa tierra del paio playa del placel [arboledas] [arecifes] C: de s. Roque	2. plazel		Grabaye p: parcel
fatoma del Rey de portogul	1. c. de S. Roque c. del pichel R. primero R. de piedras	bayade s: dominigo rio das pedras	C: St Roch Oracapica R: datreracam St domingue R: des pierres
pernambuco aqui- sta vna	R. de virtudes pernambuco	rio das uriudes pernabuco	R: des Vertuz peruambut
		rio at... nteni	R: de estremo

B. Cape S. Agostinho to Straits of Magellan.

C: de. s. agostim [S. alexo]	C. de S. agustin S. alexo S. de s. miguel	b. de s: agustin ya de s: alexo bosta baxa rio de s: migel sierra de s: antonio	C: St agustin St alexis R: Secunde R: tierce R: St michel montaignes St an- thoine
R: del lago R: de s. francisco [uazia barriles]	R. de s. francisco	rio de s: francisco	R: allaguado R: St francoys R: de Pereira R: de camafistolas
puerto Real s. hieronimo	R. de cana fistula R. Real	rio real inime... ragoso	R: Realie R: de St hierosine
b: de todos sanctos	R. de laduda b. de todos santos ba R. de Juan stevez	c. de todos stons baya de todos stons cio baxo rio de Juan gaye	O: padram B: de tous lessaincts Terre cortada Liuhare R: de St Jhan

Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
	R. de s. agustin	rio de deplaya rio de s: agustin	montaigne haulte B: de St agustin B: de prey P: Seur R: du port Sale R: des cosmos R: des Voltes P: Seur R: de brasill R: de St Jehan
R: delos cosmos		2. rio dolos cosmos	
R: delas estrellas R: de s. Jorge	R. del brasil R: de s. jorge C. de S. julian	3. g: segura 4. s: lucia 5. c: de s: Juan	
R: delas ostias		1. rio de las ostias baxos de abreluiyo augla	C: da brill P: e de Laguada B: de Lislet
monte pascual [ya de barbora] baxos delos pargos		baxos delos pargos c: s: tome	Basses de pargus
b: del saluador	salvador		B: de Sauluer Bonne Veille ye de St Roch
sierra de s. lucia		g: baxo s: lucia rio delgado c: frio	R: de qanto
C: frio R: de la India	C. frio R. de la india b. de genero y. de coles	rio genero sarbicero rio delestremo baya de los reyes rio de culpate	ye de bone Viste R: de se claire G: des Ruueres Curapate Ye de St Seba- stien
R: del stremo	b. de los reyes		
p: de s. sebastian	sierras de san se- bastian R. de s. sebastian s. vicente de buen abrigo	rio de s: sebastian c: s: uicente buenabrigo playa rio hubay la cananea p: o de la barca	St Vincent B: petite Canauce R: allaguado R: de estremo Peloponeso R: de drazus
R: de la cananea	vbuay(?) la cananea R. baxo		
R: de s. francisco	puerto de s. fran- cisco puerto de s. se- bastian	sola s: francisco p: s: sebastian	B: de Lislet G: de ceppri
[y: de s. catalina]	y. de s. catalina	playallana sontana y: de s: catalina y: del repara p: a de patos	
a: de los patos	puerto de los patos		R: de patus Terre de S: e anne R: de Lica Coste des Ansses
R: delos negros [C. de Juan de Lix- boa]			Terre haulte G: de ronlira R: martin R: de St pierre
	puerto de don Ro- drigo	p: a de don rodrigo	
[arecifes]	R. ciego faraioi	rio baxo el farallon	Coste darca Coste Basse poincte des ansses
	tibiqueri vbuai(?)	cerada rio pablado blaya tib quari yquay y: a de s: maria candelaria c: o de s: maria	2. C: de S: e marie 1. Terre de Solis
C: de s. m: a C: de buendeseeo tierra de solis	c. de s. maria		

Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
y: de R: o aluaro	r. de la plata	y: as de rodrigo aluarez	R: DE PLATE
y de xpoual jaques		s: gabriel ... gar?	
[R. negro de uruay]	R. vruay	y: a de martin el rio de saluador rio negro el rio de huruay begahaes camaroes guarams el salto gaze elrio chandules rio de la traicion santona rio del paraguay rio ypetin rio de maforeta rio deyanas rio de carca reas	
[R. de paraguay] [R. de epiti]	R. paraguay ipitin	s: espyrito deparana el granrio rio delos quirandos	Riuieres de prata
[R. de carcarana]	Sti spiritus		
[R. de porana] R: Jordam	R. parana		
C: de s. antonio	buenos aires		C: de S: e appoline forestz Coste de Sablon blanc C: taiado
p: de s. elena arenas gordas tierra delos humos baxos anegados	c. blanco arenas gordas b. anegada	c: de s: elena arenas gordas tierra de las fumos baya de baxos anegados aruoladas palmares tierra baxa arenas blancas arenas de 3 puntas baya sinfonda axacifes	Ceste coste na en- cores este visitec
tierra baxa barreras blancas	tierra baxa barreras blancas	tierra baxa arenas blancas arenas de 3 puntas baya sinfonda axacifes	B: de S: t mathien La chaudiere
tres puntas b: sinfondo arrecifes delos lobos C: de s: domingo R: de cananor	c. de 3 puntas b. sin fondo arrecife de lobos c. de s. domingo p. de los leones	c: s: domingo rio de cananor cio holarico tierra alta	C: de S: t dominic Terre haulte Abroio Terre de marchio C: de mognote R: de S: t Jehan
tierra de marco C: blanco R: de Juhan ser- rano b: delo trabajos y: delos patos y: de s. son	c. blanco b. de Juan serrano b. de los trabaxos	baya de los trabay y: a de san sone	G: de tranqil y: e de pacq P: de lat Terre des Basses
tierra delas baxas sierras hermosas p: o de s. Julian R: de la + b: de s. tiago R: de s. ylafonso C: delas xjll vir- gines	tierra de baxos sierras hermosas b. de s. Julian R. de s. + c. de las virgines	baya de s: Julian baya de la cruz baya de santiago c: de onzemil vir- gines	P: S: t Jalian B: de S: t Jaques R: de Lat C: des Vierges
C. Straits of Magellan and Tierra del Fuego.			
estrecho de fernam de magallanes b: de la uitoria b: del norie canal de todos sanctos	estrecho de magel- lanes b. de la vitoria	baya de la vitoria baya del norte canal de todos stons	Destroit de Ma- gellan B: de la Victoire B: de nord Teste de Toq

* The names of *arrecifes*—*los reies* are of later date.

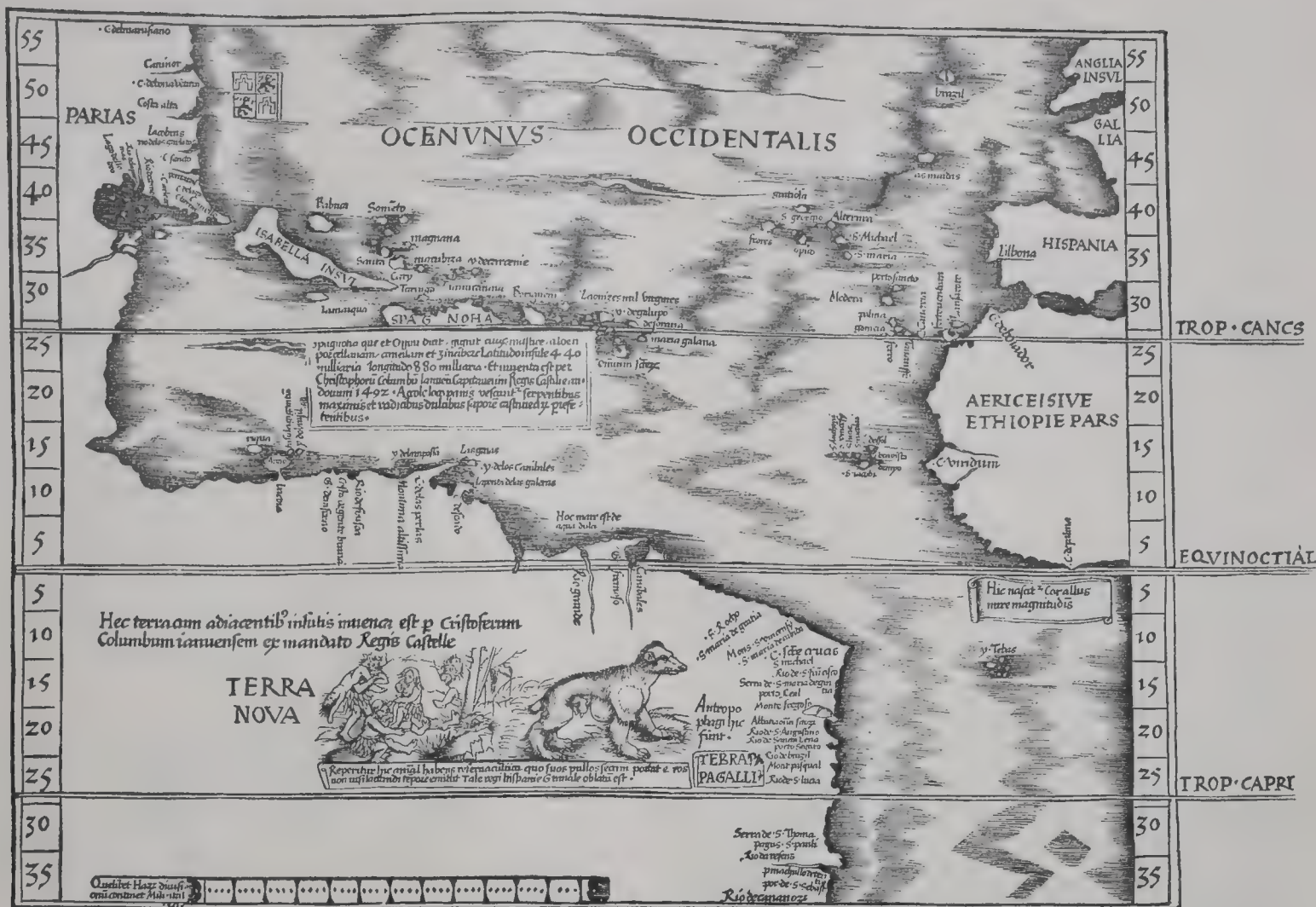
Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
arcepielago del ca- bo de seado	arcepielago del ca- bo deseado	c: de seado	P: e des Sardines Archipel de cap delraio Vahene Sainctz
[Sierras delos hu- mos]	sierras de humos	c: das 3 puntas baya primera p: desierto baya honda siera delos fumos	
lago delos estre- chos	del lago	lago delos estre- chos toado los fuegos	
tierra delos fuegos sierras neuadas canpana de roldam y: as neuadas C: de seado	sierras nevadas canpana de Roldan y: s nevadas	canpamia deroldal y: neuadas c: deseado	
4. The west coast of South America.			
	arracifes lagrabara	baya delas me- chas ys: C: de scanso del . g: o araqifes la gram-baya y: as desarayas rio demaure p: o de seado aruoreda palmas baya de s: Juan p: o dudoso xaguos de la gua- sabara p: a dupuntal despoblado rio de chichas Achapa espostrero de la pablado hulo tabapala rio de ariquipa playa aruolada playa p: a del obos sangalan chinca el guarca pachacamo lac sudaq delos reyes de sieras	playne S: t guille chracha Guanape Pachacama Les Sieges des Roys Lina Chontal Farmonga Garmey Casura mambacho S: a feror Guanape Terragillo
[chincax: abdad:]	chinchaca		
[y. de s. Roq]	pachacara		
	puerto de la con- cibicion palmonga	p...mena	
[provincia de sierra morena] [p: o de malavrigo] [y. de buena vista] [C. de s. maria]	sierra morena	2. sieramorena 1. p: a de malabriago	mallabry
[C. de nieues]	de sardinias c. de languilla puerto de paita	c: s: maria y: a delobos c: de laguaya payta	y: s des loups La carica C: de Langoute

Anon. 1227.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
y:as de s. antonio [punta de saunuo]	c. blanco S. miguel R. de tumbes	2. c: blanco 1. s: migel rio do tumbes rio de la balsas enlope(?) tumbes	R: St michel R: de tumbes R: de balcas piunpa p:re de treme S:re claire La Vieille p:re de S:re helene Odon Collongo Collao p:re de St Laurens p:ra Vicio La plate Baye des carraques Coaque Caxinies pacao
[tumbes] [R: de la ascension]			
[s. clara] [y. de s. tiago] [s. elena] [C. de la Vuelia]	2. de clara trihala 1. c. de s. elena	c: de s: elena rarapato	
[la mogeta]	callao		
[R. de s. barbara]	puerto viejo	p: meyo b: decara	
	pasao quaque	pasao coaquer	
[C. de s. franco] [anco de Sarbinas] [B: de s. lucas] [C. de s. nicolas]	c. de s. francisco b. de s. mateo R. de s. tiago R. de s. francisco y. del gallo	bay de s: matheo cobache	C: de St francoys G: de St mathieu G: St Jacques Y:re de Gallo Cabacha G: alegre Gergona La magdalene 2. p:re du peru 1. R: de St Jehan
[s. xpoval] [R. de madilena]		baya de mangles rio del pera rio de s: Juan popepan rio de salmas rio de las balsas cio quenido rio de lempa rincon	R: des palmes C: qaiade Capisagra R: de camisagra p:re de oferta
[R. de s. Juan] [furna] [p:re dulce]	c. quemado		
[C. de fartoa] [turan] [p:re de pinas]	p. decierta	m. p: de oferta	
G: de s. migel	R. primero s. miguel	1. p: de pignas rio primero rio de simy	R: premiere B: de St michel

5. The west coast of North America.

y: de perlas panama	panama natan	y: de perlas panama Togue	y: des perles panama Taboga
p: de chame [G: de paris] p: de guerra	punta de guerra R. de gerra	s: de paris p: de gera rio de gera	p:re de bymea G: de paris p:re de ygnara R. de Serra p:re de bone Viste y:re de Selaco
p: de buenauista y: de cebaco y: de gatos y: de s. maria	y. de s. maria y: de buena matia p. de la borica	y: de s: maria p: de s: maria y: de bonamacia p: de burica g: de osa c: de s: maria y: del cano g: de s: lazaro s: lucar	y: de S:re marie y: de S:re marie y: de Gatos p:re de Lorica C: de S:re marie y: de cap P:re de St Lazare St lucar
y: del cano	2. punta de s. maria 1. y. del campo golfo de s. lucas		
y: de s. vicente c: del farallon blanco pocosi para [las uelas]	g. de faraiol blanco	c: defarallon blanco pocosi pari moya	C: du forillon blanc moya

Anon. 1527.	Alonso de Santa Cruz 1542.	Sebastian Cabot 1544.	Pierre Desceliers 1546.
[s. catalina] g: de s. tiago	golfo de san tiago	s: cantalina g: de s: tiago	p:re de lratheline(l) y:re de coques
marduce las salinas micaragua	nicaragua R. de mesa	m. saragua rio de pesesion s: pedro uelabien baya de fonsera c: bermoso g: de chirotega guatimala guatimala rasulta	nicaragua R: de pocession G: de fonceca St michel
[s. petro] velabien	b. de fonseca c. hermoso b. de quirotega guatimala R. del campo R. grande los frailes golfo de guapocan punta de cortes coira tegucantepeque del marques		
C: hermoso			
y: de flecheros p: de baxas rostro fragoso las pueras aguada de brijos las matas R: ciego	R. gerrado los pelagios tegucantepeque	sieras de gil. go: cales dauila tequantepeque guatulco los fara llones tres islas tierra alta auipulto cigultaneyo cacatula motin colimario de san- tiago c: de corientes S: Tome y: de dexalisio xalisco Aruoreda casta derecha rio de s: juan rio desal rio de s: migel culuaran guayanal y san poblo rio de s: p:re rio deuo bosesteros rio de s: J: rantisco baya de posesion p: de los puertos p: de plagas pasaye de s: migel Damotes Anconde s: Andres maba beyo	Caxulla Tequante peque Palinaria les deulx forillons
R: de s. grigorio la punta del pico playas de 2 Rios playas de cerezeda las sierras dardena la laguna sierras de gil gon- calez dauila			
	çacatula c. delisleo colimac plaia ancon R. Grande y. blanca golfo salido		
	R. del spiritu santo colimar		
	y: que descubrio el marques del valle tierra que enbio a descubrir don antonio de men- doça		



83. The Atlantic Ocean and the East Coast of America. From PTOLEMAEVS, ARGENTORATI 1525. (Original size within the frame 0.374 x 0.285 m.)

The Oldest Maps of the New Hemisphere.

Many of these are already enumerated, partly in chap. X, where the most ancient maps of the coasts of the North Sea, the Baltic, and the Arctic Ocean are mentioned, partly in the preceding chapter, which contains an account of the cartography of Asia from 1492 to 1561. Those maps mentioned in chap. X if they contain Greenland, also belong to Cartographia Americana, and most of the maps of the world, entered in the list of the preceding chapter, embrace the New World. As regards these two groups of maps it is therefore only necessary to refer the reader to the aforesaid descriptions and reproductions. Moreover as the numerous references prove, the list is largely founded on HARRISSE'S "Cartographia Americana Vetustissima" (*Disc. of N. Am.*, pp. 365—648) and SOPHUS RUGE'S *Die Entwicklung der Kartographie von Amerika bis 1570* (Petermanns Ergänzungsheft No. 106, Gotha 1892). As to the list of maps in Harris's work, which is made out with so much care, and with access to such rich material, it is a source of regret that no distinction, easy of notice, is made between maps that are still extant and those which are only mentioned in printed or written documents. A few new finds have been made in the recesses of the archives since Harris's work was issued in 1892. An essential difference exists between the following list and Harris's comprehensive monograph, as maps of Greenland are not comprised in Americana in Harris's work. This seems to me an error, since not only does Greenland rank among the countries of the New Hemisphere, but expeditions had been equipped and sent thence to the continent in the south ever since the time of Eric the Red.

I shall therefore commence the following list of the oldest maps of the New Hemisphere, or parts thereof, with:

A. Pre-Columbian Maps of Parts of the New World.

1. 1424. Anonymous portolano at Weimar containing the island *Antillia*. As the mention of this large island, the name of which was afterwards given to the *Antilles*, in the portolanos of the fourteenth century, is probably owing to some vessel being storm-driven across the Atlantic (as according to Behaim happened to a Spanish vessel in 1414), those maps on which this island is marked must be reckoned as Americana. But it seems to me that the islands *Insula de Brasil*, *Insula de Mam* and *Insula St. Brandan* do not entail this right, as in case these names imply anything other than imaginary islands, they probably refer to islands in the Old Hemisphere. With regard to the legend of Antillia compare p. 195 of KRETSCHMER'S work previously cited.

2. 1426 and 1435. Portolanos by BECHARIUS, including the island Antillia. Compare preceding, p. 164.

A. E. N. II.

3. 1427. FA, fig. 27; N. fig. 36. A map of the North by the Danish geographer CLAUDIUS CLAVVS in a Ptolemy codex preserved at the town library at Nancy. Often reproduced and monographically described in works enumerated above (p. 90). This is the first dated map on which a really known American land (Greenland) is delineated.

4. 1436. ANDREA BIANCO'S portolano containing the island Antillia.

5. 1455. Planisphere by PARETO (pl. V in KRETSCHMER). The parallelogram island, Antillia, is entered here (compare preceding, p. 164).

6. Fifteenth century. N. fig. 35. A Scandico-Byzantine map of the North, also embracing Greenland, on Marinus' equidistant projection, entered in a codex of Ptolemy at the National Library at Florence. The map is obviously a copy from an original dating from the close of the thirteenth or beginning of the fourteenth century.

7. Fifteenth century. N. pl. XXXII. A Scandico-Byzantine map on Donis' projection, included in a manuscript by CHRIST. EUSENIUS: *Descriptio Cicladum aliarumque insularum* (compare p. 88).

8. (1470.) FA, pl. XXX. A Scandico-Byzantine map on Donis' projection, in a codex of Ptolemy in the Zamoiski Library at Warsaw. (Compare above p. 87 and FA, p. 55.)

9. (1470.) N. fig. 34. A map similar to the preceding and certainly copied from the same original, in a codex of Ptolemy in Biblioteca Laurenziana (compare p. 87).

Of the maps 6 to 9, which all give comparatively correct outlines of Greenland, map 6 is an unaltered copy or rather translation of the Scandico-Byzantine original. The maps 7, 8 and 9 are copies of map 6, drawn by a good cosmographer on a new projection, less disfiguring to the countries of the Far North than maps drawn on Marinus' equidistant projection. On all these maps, Greenland is placed in a fairly correct latitude. The original document must therefore have been made without the aid of the compass, a fact which confirms the supposition that the maps are from the close of the thirteenth or commencement of the fourteenth century. I shall therefore henceforth call them *Scandico-Byzantine Maps, type A*. After the introduction of the mariners' compass it was found that the relative position of the countries on the maps did not agree with the directions indicated by the compass. In accordance with the demands of the uncorrected compass, their position was corrected, so it was thought, but in reality was so distorted that Greenland got a totally incorrect position. A map, drawn by hand and showing the incorrect type, thus originated, is map 11.

10. 1476 and 1482. Portolanos by BENINCASA, including the parallelogram island Antillia (comp. p. 164).

11. (1482.) FA, fig. 35. A map of the European North and Greenland with much about the same legends as are on maps 6—9. It is included

in a Ptolemaic codex in the Bibliothèque royale at Brussels (*cf.* p. 88). No other hand-drawn map of this type is known, but similar maps have often been published in print. In what follows I shall designate them: *Scandico-Byzantine Maps, type B.*

12. 1482. FA, fig. 36. Scandico-Byzantine map of type B, printed in PTOLEMY, Ulmae 1482. This is the first printed map embracing any part of the New World. The map is a rough but powerful wood-cut.

13. 1482. Portolano by BERTRAN, including a nameless parallelogram island corresponding to Antillia. (KRETSCHMER, p. 204.) In the list of portolanos (*supra* p. 63) according to Uzielli-Amat inserted under the year 1491.

14. 1486. Scandico-Byzantine map of type B, included in PTOLEMY, Ulmae 1486, and printed from the same block as No. 12.

15. (1492.) N. fig. 54. Map of the world by MARTELLUS GERMANUS. *Vide supra* p. 128. The manner in which Greenland is drawn is followed in several maps of the world printed during the first fifty years of the sixteenth century. I suppose that it is this map which is mentioned by JUSTIN WINSOR (*Bibliographical Contributions, No. 19: The Kohl Collection of maps relating to America*, Cambridge, Mass. 1886) as "No. 23. A. D. 1490, Portuguese map of the world".

16. 1492. FA, fig. 40. Globe by MARTIN BEHAIM. The island Antillia is marked, bearing a long inscription and the statement that a Spanish vessel touched at the island in 1414 (*vide supra*, p. 164).

B. Maps of the New World after 1492.¹

17. (1495.) FA, fig. 41. The *Laon Globe*. Antillia is marked. Compare above p. 128.

18. 1500. N. pl. XLIII, XLIV. Cosa's map of the world. Cart. As. 4.²

19. (1502.) N. pl. XLV. Portuguese map of the world, in the possession of Mr E. T. HAMY. Cart. As. 5.

20. 1502. CANTINO's map of the world. Cart. As. 6.

21. (1502.) CANERIO's map of the world. Cart. As. 7.

22. (1503.) N. figg. 79—81. Three sketch-maps which Fr. R. v. Wieser found as marginal drawings on a copy of a letter from Columbus when in Jamaica, dated July 7th, 1503. This copy is incorporated in a collection made by Alexander Strozzi of pamphlets concerning the early voyages of discovery to America, now in Biblioteca nazionale at Florence. These sketches Wieser thinks were derived from Bartholomaeus Columbus (*Die Karte des Bartolomeo Colombo über die vierte Reise des Admirals, von Fr. R. v. Wieser, Innsbruck 1893; Mittheil. d. Instituts für österr. Gesch.-forschung*). They are formed of careless pen and ink sketches, which however cast a light on the opinion held by Columbus and his brothers concerning the distribution of land round the Atlantic. The map of southern Asia is on the Ptolemaic pattern, with those modifications which the circumnavigation of Africa entailed. "Calicut" and some other places known from the Portuguese voyages are marked, but on a peninsula west of the Indus. The inscription at the equator on the map of Africa ("secondo Marino e Colombo da C. San Vicentio a Cattigara g. 225, secondo ptolomeo infino a Cattigara g. 180") reminds us of the great geographical problems of the 15th century, so differently answered by different geographers.

23. (1503.) Map of Hispaniola (0.410 x 0.290 m.) drawn by hand on parchment and bound with a copy of *P. Martyris angli mediolanensis opera*, Hispali 1511, which belonged to Fernando Columbus and is now in the Bibl. Colombina at Seville. Possibly only a fragment of a larger map. HARRISSE's first opinion that the map "seems to be in the handwriting of Christopher Columbus" (*Bibl. Am. Vetust., Additions*, p. 56), he seems to have abandoned later on (*Disc. of N. Am.*, p. 433).

24. (1503.) "Kunstmänn No. 3." A Portuguese-Catalan map of the world, now at the Royal Library in Munich. Cart. As. 8.

25. (1503.) "Kunstmänn No. 2." Map of the world in the Royal Library at Munich. Cart. As. 9.

26. (1505.) PEDRO REINEL. An undated map, drawn on vellum, signed "Pedro Reinel a fez", comprising Europe, part of Africa and a small portion of America. This map was first described by SCHMELLER (*Abh. d. Philos.-Philolog. Classe d. Königl. Acad. d. Wiss.*, IV, 1, München 1844, p. 247). Part of it is reproduced by KUNSTMANN (*op. cit.* pl. I) and by KOHL (*Documentary History of the State of Maine*, Portland 1869, pl. IX, p. 177). The map is also described by HARRISSE (*Disc. of N. Am.*, p. 435). Compare PESCHEL: *Gesch. d. Zeitalters d. Entdeckungen*, p. 332. Pedro Reinel was a Portuguese navigator, who together with his brother Jorge "Piloto Portugues de mucha fama" in 1522 entered the Spanish service.

27. 1506. Small maps of the West India islands and part of the coast of South America in a manuscript, now at Ferrara, of a collection of voyages, afterwards printed with the title *Paesi novamente ritrovati*. According to HARRISSE (*Disc. of N. Am.*, p. 440) they are copies on an enlarged scale from some map of the world like Cantino's. Several of the maps of Sonetti and Bordone (compare pp. 71, 72) as also the maps of Gotlandia, Frisland, Majorca, Minorca etc., which during the latter part of the sixteenth century were engraved on copper by Berteli and others, were doubtless founded on sources as little reliable.

28. 1507 and 1508. FA, fig. 14. *Tabula moderna Prussiae, Livoniae, Norvegiae et Gottiae* in PTOLEMY, Rome 1507 and 1508. A Scandico-Byzantine map of type B, comprising Greenland, which is, as on all maps of this type, placed north of Scandinavia.

29. 1508. FA, pl. XXXII. RUYSC's map of the world. Cart. As. 11. If the drawings of Greenland be not counted among Americana, this curious map is the first map of America reproduced in print.

¹ Several anonymous portolanos are omitted from this list, even though they embrace the New World. Of the signed portolanos, works of the same maker of different dates are, as a rule, entered under the same number.

² In this manner I refer to those maps of the world which have been already mentioned in the list of the most ancient maps of Asia. (*Supra* pp. 149 et seq.)

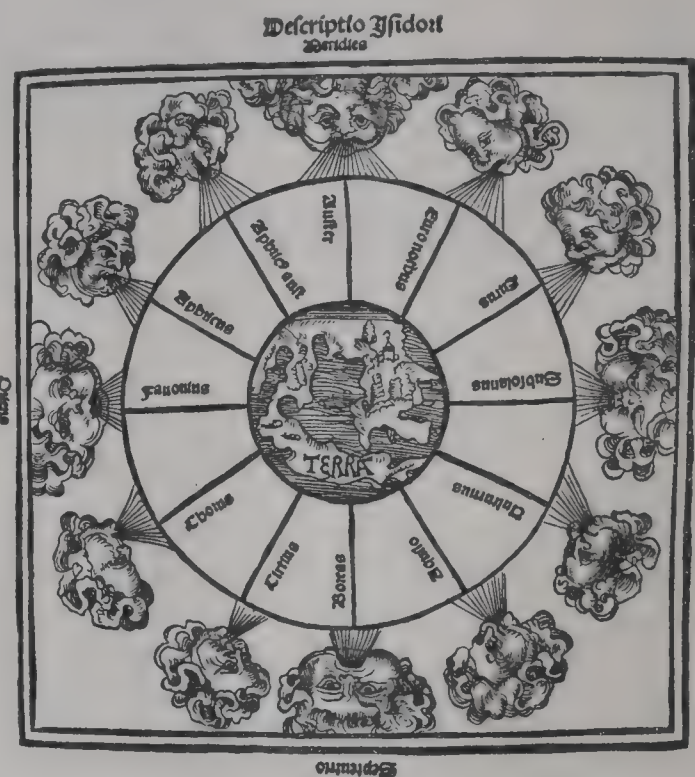
30. 1509. FA, fig. 22. Wood-cut on the title-page of *Globus mundi*, Argentorati 1509. It represents the Old Hemisphere, but far to the south west a piece of Brasil projects in, with the inscription "Neuw-welt". Cart. As. 13.

31. (1510.) FA, fig. 43. The LENOX Globe. Cart. As. 14.

32. (1510.) Print of a globe in the Hauslab-Lichtenstein collection. Cart. As. 15.

33. 1510. N. fig. 82. Two maps of the world by HENRICUS GLAREANUS, in the University Library at Bonn. These were recently found by Professor ANTON ELTER bound in a copy of PTOLEMY, Ulmae 1482. Both in respect to geography and drawing they resemble the map by Glareanus now in Munich, mentioned above (Cart. As. 34). The maps found in Bonn possess one advantage, namely, that one is dated "Agrif-pinae . . . Anno . . . MD decimo Calendas April. tertio". Probably the Munich map is from about the same time. In all these maps the southern part of the New world is called "Terra America" and they are the first maps in which this part of the world is so called. As to the relation of these sketches to Waldseemüller's or Hylacomylus' *Cosmographiae introductio*, Deodate 1507, and to *Globus mundi declaratio*, Argentorati 1509, I beg to refer the reader to Professor ANTON ELTER's pamphlet: *De Henrico Glareano geographo et antiquissima forma "Americae" commentatio*, Bonnae 1896. Probably these sketches, as also Stobnicza's map and the oldest globes made in Germany during the first two decades of the sixteenth century, are all based on the maps of Waldseemüller mentioned in the above works, but now lost.

34. 1511—61. Portolanos by VESCONTE and JACOBUS MAIOLO, comprising not only the countries in the normal portolano but also portions large or small of the lands lately discovered. Cart. As. 16. The American part of a Maiolo map, dated 1527, is reproduced in KRETSCHMER, pl. XIV, 7. — An atlas by Vesconte Maiolo with assigned date 1504 was exhibited in Venice in 1881 (*vide supra*, p. 64), but it is not known where it is at present.



84. Geographical diagram by JUDOCUS ISENBACHCENSIS 1514. (Original size 0.137 x 0.135 m.)

35. 1511. FA, pl. XXXIII. Map of the world, comprising parts of the New World, in BERNARDUS SYLVANUS' Ptolemy, Venetiis 1511. Cart. As. 17.

36. After 1511. Map of the world engraved on metal by PAULUS AGEMINIUS (Paul the engraver). Cart. As. 18.

37. After 1511. An anonymous map of the Indian Ocean, at present in Munich. The map shows the west coast of America from 4° S. lat. to 40° N. lat. Cart. As. 19. A drawing of the curious outlines of the land of this map is given by WINSOR (*Hist. of Am.*, II, p. 440).

38. After 1511. FA, fig. 38. Map of the West Indies in some copies of PETER MARTYR's afore-mentioned work, Hispali 1511. HARRISSE (*Disc. of N. Am.*, p. 474) says that this map was executed after 1512, and then bound with the edition of Martyr's work just mentioned. It is the first printed special map of any part of the New World.

39. 1512. FA, pl. XXXIV. STOBNICZA's map of the world. Cart. As. 21.

40. 1513. FA, pl. XXXVI. *Tabula terrae novae* in PTOLEMY, Argentorati 1513. In consequence of a statement in Ptolemy, Argentorati 1522 (FA, p. 21) this map is supposed to have been drawn by Waldseemüller. As I have previously remarked I consider that this is owing to a misapprehension of the words which occur in the edition of 1522, fol. 100 verso: "Et ne nobis decor alterius elationem inferre videatur,

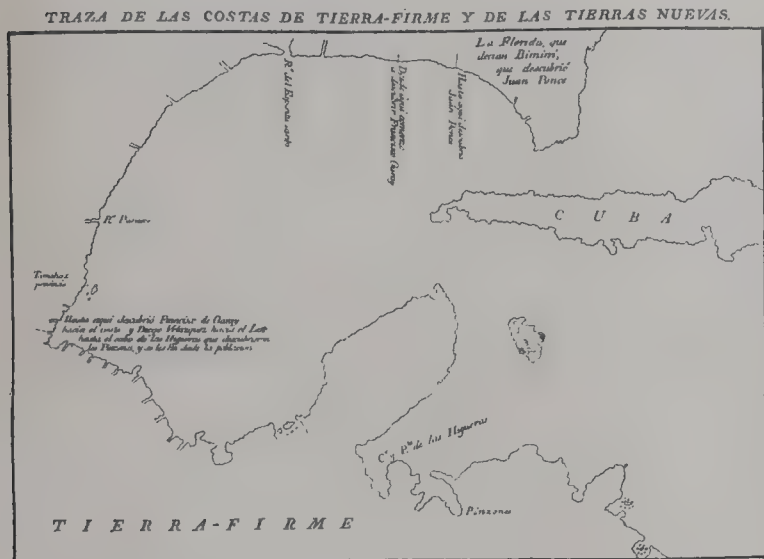
has tabulas e novo a Martino Ilacomio pie defuncto constructas et in minorem, quam prius unquam fuere, formam redactas notificamus." These words in my opinion simply state that for the Ptolemy of 1522 Waldseemüller redrew and reduced to a smaller scale those maps of the edition of 1513. The map, a rather roughly executed wood-cut, may be considered the first map of the Atlantic from 35° S. lat. to 55° N. lat.

41. 1513. FA, pl. XXXV. *Orbis typus universalis juxta hydrographorum traditionem* in PROLEMY, *Argentinae* 1513. Cart. As. 22. The drawing of Scandinavia and Greenland exactly resembles the drawing of the map by Martellus Germanus (N. fig. 54).

42. 1513. *Tabula moderna Norbergiae et Gotthiae*, coarse wood-cut in PTOLEMY, *Argentinae* 1513. Scandico-Byzantine map of the North of type B.

43. 1514. N. fig. 84. JUDOCUS ISENNACHCENSIS (Jesse Trutvetter). Under this name but as of the year 1524 (Cart. As. No. 43), HARRISSE enters this map according to Edwin Tross' book catalogue of 1868 as "A map of the world, representing the entire American continent". Probably it depends on a mistake in the writing of the date. In my own copy I find: *Summa in totam physicen: hoc est philosophiam naturalem conformiter siquidem verae sophiae: quae est theologia per D. JUDOCUM ISENNACHCENSEM . . . elucubrata (!) et edita.* (Colophon:) *Impressum Erfordiae per Mattheum Maler . . . anno Millesimo Quingentesimo decimoquarto.* So 1514, not 1524. The work certainly contains (for making clear the theory of the two hemispheres?) a geographical drawing, printed in duplicate on either side of a special sheet, in which a perhaps too lively imagination has recognized a map of the entire continent of America. On sheet m. i there is a short discussion of the question whether antipodes really exist: "quemadmodum recentiores cosmographi experitum referunt." No other hint of the great geographical discoveries have I been able to find in this encyclopaedia of about 300 closely printed quarto pages.

44. (1514.) FA, pl. XXXVII. A globe map engraved on copper, supposed to have been executed by LUDOVICUS BOULENGER. Cart. As. 23.



85. Map of the Gulf of Mexico by PINEDA, about 1519. After Navarrete.
(Original size 0.291 x 0.204 m.)

45. (1515.) FA, pl. XXXVII. A globe-map in my collection.
Cart. As. 24.

46. 1515. FA, pl. XXXVIII. Map of the world in REISCH's *Margarita philosophica nova* of this year. Cart. As. 25.

47. (1515.) A globe drawn by hand (*The Paris Green Globe*) in the Bibl. nationale of Paris. Cart. As. 27.

48. (1515.) FA, fig. 46 and 47. Printed globe supposed to be drawn by SCHÖNER. Cart. As. 28.

49. (1515.) A globe drawn by hand in the Hauslab-Lichtenstein collection. Cart. As. 29.

50. (1518). Maps drawn by hand and occurring in a collection of writings by ALESSANDRO ZORZI for a new edition of *Paesi novamente ritrovati*, preserved in the Biblioteca Magliabechiana of Florence (Cod. 24, class. XIII), mentioned by HARRISSE (*Disc. of N. Am.*, p. 494) but without any account of which parts of America are comprised in the maps.

51. 1519. Map of Porto Rico (0.26 x 0.16 m.) sent to Charles V by Rodrigo de Figueroa. Preserved in the Simanca Archives (Muñoz collection, vol. LXXVI, fol. 153). HARRISSE, *Disc. of N. Am.*, p. 500.

52. (1519.) Map of the West Indies and Central America, in the Grand Ducal Library at Wolfenbüttel (HARRISSE, *Disc. of N. Am.*, p. 502).

53. (1519.) FA, pl. 45. A map of the world on a curious projection, drawn by hand, and found among papers that once belonged to LEONARDO DA VINCI. Cart. As. 30.

54. (1519.) N. fig. 85. Special map of the Gulf of Mexico (0.43 × 0.32 m.) laid down by PINEDA at the command of FRANCISCO DE GARAY. The original still exists in the Indian Archives of Seville. A copy is given in NAVARRETE's *Coleccion de viages*, III, p. 148. Compare HARRISSE, *Disc. of N. Am.*, pp. 152 and 502, as also KRETSCHMER, p. 391 and pl. XIV, 6.

55. 1520. Anonymous Portuguese map, reproduced on pl. IV in KUNSTMANN; mentioned in his text p.129. The original is in the Royal

Library at Munich (HARRISSE, *Disc. of N. Am.*, p. 508; KRETSCHMER, pl. XII).

56. (1520.) Two printed maps of the globe which belonged to Libri. Above North America we read: "Gioane de Bo da Venecia". (HARRISSE, *Disc. of N. Am.*, p. 509.) The date given to this map, founded as it is on the brief description in Libri's sale-catalogue (1859; No. 1551), seems rather uncertain.

57. 1520. A hand-drawn globe by SCHÖNER, kept in the Germanic Museum at Nuremberg. Cart. As. 31.

58. 1520. FA, pl. XXXVIII. PETRUS APIANUS: *Tipus orbis universalis* etc. Cart. As. 32.

59. 1520. Three wood-cut maps of America or portions thereof entered in PTOLEMY, Argentorati 1520. Printed from the same blocks as the corresponding maps in the Ptolemy of 1513 (above Nos. 40—42).

60. (1520). N. fig. 91. Two maps drawn by hand by GLAREANUS, now in the University Library at Munich. Cart. As. 34. As the maps found by Professor Elter in Bonn prove, these maps were probably in existence in the beginning of the second decade of the sixteenth century. (Compare No. 33).

61. ¹⁵²². FA, pl. XXXIX. LAURENTIUS FRISIUS' map of the world.
Cart. As. 36.

62. (1522.) An insignificant map of the New World, entered on the title-page of some copies of: *Isagoge in typum cosmographicum* etc., Landshut (s. a.). We have here the sale programme of a large map now



86. Map of Magellan's Straits by PIGAFETTA, about 1522. From Amoretti.
(Original size 0.212 x 0.214 m.)

lost. Some copies have as a title-vignette a circular map of the Old World others a corresponding map of the New. Cart. As. 38.

63. 1522. N. fig. 83. *Oceani occidentalis seu terre nove tabula*. Entered in PROLEMY, Argentinae 1522. Closely corresponding to a map in the Ptolemy of 1513 and 1520, but still with essential differences, in consequence of which I reproduce it in this work on a reduced scale from the impression of 1525, on which a title printed on the impression of 1522 *E. Tabula terrae Novae F. D. W.* has been omitted. Verso of the map there is a very interesting text, beginning: "Christophorus Columbus natione Italus, patria Genuensis, gente Columba vir erat proceras statura, valens ad subedinem inclinato, facie oblonga" etc. (in the same edition

64. 1522. *Tabula Nova Norbergiae et Gottiae* in the same edition of Ptolemy as the preceding. A Scandico-Byzantine map of type B. A slightly altered copy of the corresponding map in Ptolemy of 1513.

65. 1522. *Tabula moderna Gronlandiae et Russiae*(!). Under this title a map of the world is published in the Ptolemy of 1522, embracing not only Greenland but also some parts of America. It is a copy but little altered from *Hydrographia sive Carta Marina* of the Ptolemy of 1513. Among the alterations a figure resembling an elephant, which is in the north west corner of the map, is worth noticing. A long inscription ("Morsus animal ingens . . . reperitur in promontoriis septentrionalibus norbegie" etc.) gives us the unexpected information that the figure represents a walrus.

66. (1522.) Planisphere by GIOVANNI ANDREA VAVASSORE. A Venetian wood-cut. Cart. As. 39.

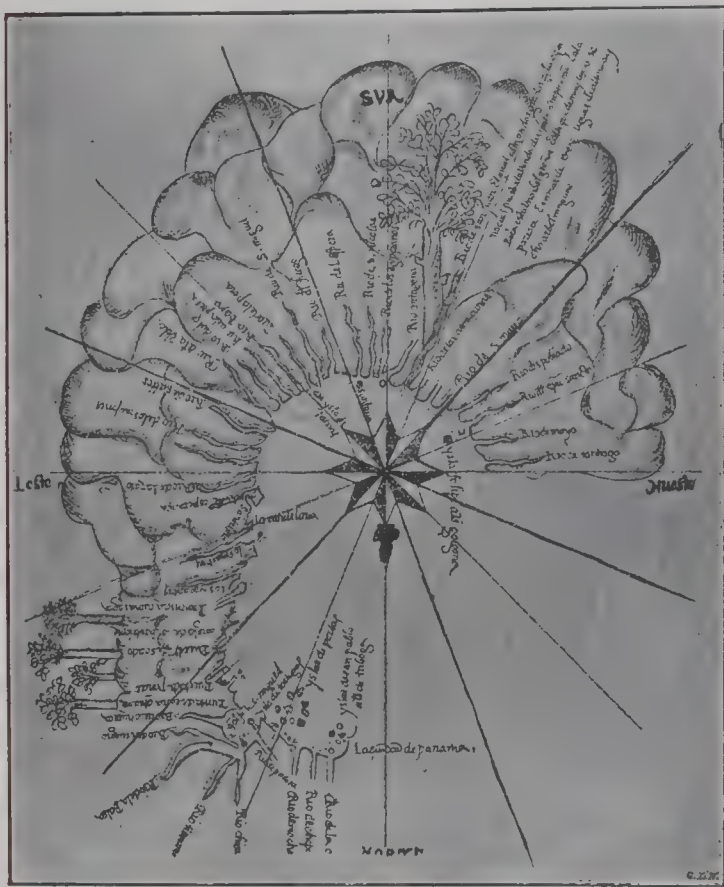
67. (1522.) N. fig. 86. Map of Magellan's Straits in the MSS. of PIGAFETTA's account of the first circumnavigation of the globe. A similar map from a codex in the Ambrosiana is reproduced here from a picture in CARLO AMORETTI's *Primo viaggio intorno il globo terracqueo... fatta dal cavalier Antonio Pigafetta*, Milano 1800. Another occurs, according to HARRISSE (*Disc. of N. Am.*, p. 516), in a MS. of Pigafetta's account now in the Bibl. nationale of Paris (*MS. Français* Nos. 5650 and 24224). The map, as will be seen from the reproduction given here, is very rudimentary and inferior both in respect to technique and geography; and from it we obtain no high opinion of Pigafetta's knowledge either as a seaman or a cartographer, even though he had circumnavigated the globe.

68. 1522. A Spanish chart by GARCIA DE TORENO, at present at Turin. Cart. As. 37. Is mentioned by HARRISSE among maps including America; but the part still extant does not seem to comprise any portion of the New World.

69. (1523.) SCHÖNERS' "Timiripa-Globe". Cart. As. 41.

70. (1523.) Large planisphere in the Royal Library at Turin. Cart. As. 42. HARRISSE in his *Disc. of N. Am.*, p. 528, has reproduced and fully described the American portion of this map, which he deems the most important of all sixteenth century sources for nomenclature along the coasts of the New World. Of the legends cited here on pp. 165-176 along the east coast of America, many are to be found on this map.

71. (1523) and 1524. N. pl. XLVII. Two slightly differing impressions of a wood-cut of a map of the world by JUAN VESPUCCI. Cart. As. 40.



87. Map of the coast-line between Panama and Gorgona by RUIZ DE ESTRADA and PEÑATE, 1525. After Oviedo. (Reduced one half.)

72. 1524. Map of the Gulf and city of Mexico in *Praeclara Ferdinandi Cortesii de Noua Maris Oceani Hyspania Narratio*, printed in Nuremberg 1534.

73. 1524-1598. Maps and geographical figures in the different editions of PETRUS APIANUS, *Cosmographicus liber*, published in many editions from 1524 to 1598, some of them being revised by Gemma Frisius. Some of these maps are reproduced in FA. Cart. As. 44.

74. 1525. Four maps relating to the New World in PTOLEMY, *Argentorati* 1525, printed from the same blocks as the corresponding maps in the Ptolemy of 1522. Some of the titles occurring on the maps of the edition of 1522, being faulty from an orthographical or geographical point of view, have been corrected in this edition or else omitted.

75. (1525.) Planisphere which belonged to MARQUIS CASTIGLIONI in Mantua. Cart. As. 46.

76. 1525. N. fig. 87. Map of the coast between Panama and Gorgona by BARTOLOME RUIZ DE ESTRADA and PEÑATE, who were pilots to Pizarro and Almagro. The pilots presented the map to OVIEDO. A copy of this map is entered in his *Historia General y Natural de las Indias*, Madrid edition 1851-55, vol. IV, pl. 4 (HARRISSE, *Disc. of N. Am.*, p. 540).

77. (1525.) A beautiful planisphere drawn on parchment, with Spanish legends mixed with Latin and Portuguese (1.490 x 0.945 m.). To judge from the coat of arms thereon, this map probably in former days belonged to Cardinal Giovanni Salviati, who from 1525 to 1530 was

Papal Nuntio in Spain. At present in Bibl. Laurenziana at Florence (UZIELLI-AMAT, II, p. 114, HARRISSE, *Disc. of N. Am.*, p. 540).

78. 1526. N. fig. 88. Map by FERNANDEZ DE OVIEDO y VALDÉS of the bay of Nicoya on the left side of the isthmus of Panama. Re-produced here from OVIEDO's *Historia*, III, pl. 2. This map and map No. 75 are probably the very earliest special maps of any part of the American Pacific Coast.

79. 1526. Oval map of the world by FRANCISCUS MONACHUS, "sa carte générale". Mentioned and reproduced, probably on a very reduced scale, by LELEWEL (*Glogr. du Moyen âge*, pl. XLVI). Is richer in names than the remarkable map cited as No. 81, so cannot be the same drawn by Lelewel on a new projection.

80. 1527. FA, pl. XLI. Map by ROBERT THORNE. Cart. As. 47.

81. (1527.) N. fig. 41. Map of the world, divided into two hemispheres by FRANCISCUS MONACHUS. Cart. As. 48.

82. 1527 and 1529. Two portolan-atlases in the British Museum, by GIAMBATTISTA AGNESE. Cart. As. 49.

83. 1527. "Carta universal", in the Grand Ducal Library at Weimar. Cart. As. 50. The American legends on this map are quoted pp. 165-176. The map has been ascribed both to Fernando Columbus and Nuño

García de Toren (RUGE, *Kart. v. Am.*, p. 49).

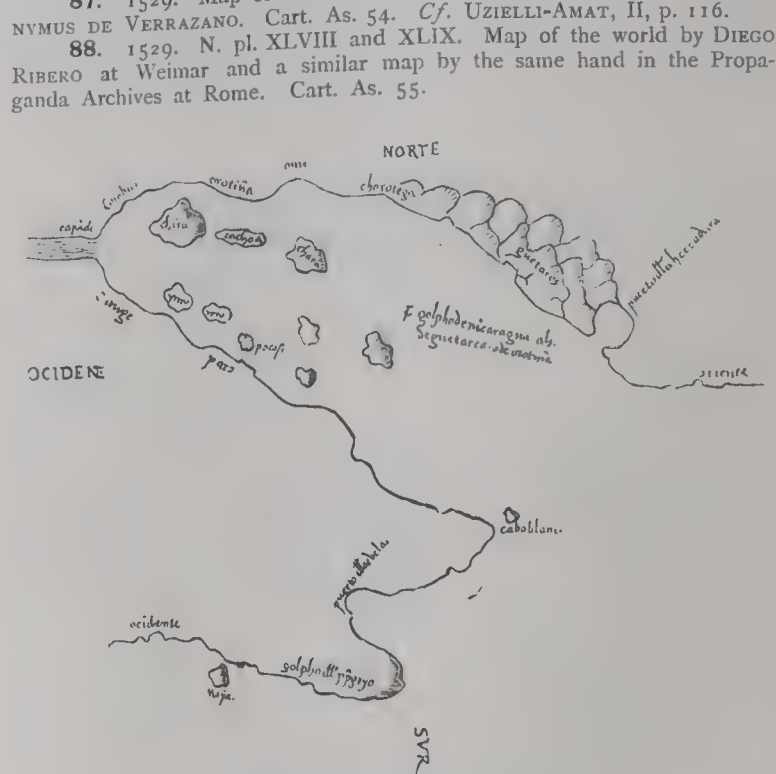
84. (1528.) *Le globe d'or* of the National Library in Paris. Cart. As. 51.

85. 1528. FA, pl. XXXIX. Map of the world by BENEDETTO BORDONE. Cart. As. 52.

86. 1528. FA, fig. 65. A small map of the world by PIETRO COPPO, printed in Venice. Cart. As. 53.

87. 1529. Map of the world in the Propaganda Archives, by HIERONYMUS DE VERRAZANO. Cart. As. 54. Cf. UZIELLI-AMAT, II, p. 116.

88. 1529. N. pl. XLVIII and XLIX. Map of the world by DIEGO RIBERO at Weimar and a similar map by the same hand in the Propaganda Archives at Rome. Cart. As. 55.



88. Map of the Bay of Nicaragua (Bay of Nicoya) by OVIEDO, 1526. (Reduced one half.)

89. 1530. N. pl. XLIV. Large heart-shaped map of the world by PETRUS APIANUS. Cart. As. 57.

90. 1530. A small map by APIANUS, printed with a change of title from the same block as Apianus' map of 1520 (No. 58). Cart. As. 58.

91. (1530.) An anonymous and undated map in the British Museum. Cart. As. 59.

92. 1530. A map drawn by hand, similar to DIEGO RIBERO's (No. 88), in the Grand Ducal Library at Wolfenbüttel. Cart. As. 60.

93. 1530. Picture of a small globe on the title page of NICOLAS PRUGNER's *Hydrographiae, hoc est chartae marinae totiusque orbis brevis sed dilucida descriptio*, Argentorati MDXXX, 16 leaves in quarto. On the globe the New World is depicted (HARRISSE, *Disc. of N. Am.*, p. 578).

94. 1530. Maps by LAURENTIUS FRISIUS (HARRISSE, *Disc. of N. Am.*, p. 579; WINSOR, *Hist. of Am.*, II, p. 220). I have not seen these maps; and both Winsor's and HARRISSE's descriptions thereof leave much to be desired as regards clearness. Some of them seem to embrace parts of America. Laurentius Frisius published a work entitled *Uslegung der Mer-Carthen* in Strassburg 1525, 1527, and 1530. A map issued with this work is reproduced here fig. 53, but it does not comprise any part of America.

95. 1530. To this year HARRISSE (*Disc. of N. Am.*, p. 579) ascribes a map of the world (0.305 x 0.216 m.) engraved on copper and entered in one of Libri's catalogues in 1864 as No. 139.

96. 1530(?). Portolano by DIEGO HOMEN in Lord Lumley's library, which after Lumley's death in 1609 was purchased by James I, and afterwards incorporated in the collections of the British Museum. (WINSOR, *The Kohl Collection*, No. 45.)

97. 1531. FA, pl. XLI. ORONTIUS FINAEUS. Double heart-shaped map of the world. Cart. As. 61.

98. 1532. Map of the lagoon Maracaybo, despatched to Charles V, probably with a report on the murder of the Governor of Venezuela, Ambrosio Alfinger, reproduced in OVIEDO's *Historia General*, II, pl. 3.

99. 1532. FA., pl. XLII. GRVNAEUS' oval map of the world. Is supposed to have been compiled by Seb. Münster. Cart. As. 62.
100. 1532. FA., fig. 31 and p. 60. Map in JACOB ZIEGLER'S *Quae intus continentur* etc., Argentorati 1532. One of the maps in this work embraces the Scandinavian peninsula and the north part of the Atlantic Ocean, including Greenland, where among other inscriptions there is "Terra Bacallaos" and "Hvetsargh promont." The map is a coarse wood-cut, but is founded on original information from the North, likewise in respect to Iceland and Greenland.
101. 1532. Portolan-atlas by BARTOLOMEO OLIVES. Cart. As. 63.
102. 1532. Oval map of the world in the second edition of SONETTI'S *Isolario*. Cart. As. 64.
103. 1533. A globe drawn by hand by SCHÖNER(?). At the Military Library at Weimar. Cart. As. 66.
104. 1534. Catalan atlas at the Town Library at Havre. Cart. As. 68.
105. 1534. FA., fig. 66. Oval map of the world by JOACHIMUS VADIANUS. Cart. As. 69.

110. (1535.) A globe drawn by hand, probably by VOPEL, at the Bibl. nationale at Paris. Cart. As. 72.
111. 1535. A map of California in the Indian Archives at Seville, bound with "Acta de posesion de la Nueva España", dated May 3rd, 1535. Compare HARRISSE, *Disc. of N. Am.*, p. 611. Reproduced by WINSOR ("Cortes' map of the gulf of California"; *Hist. of Am.*, II, p. 443).
112. 1536. A map of the Gulf of Mexico, which once belonged to Alonso de Santa Cruz (HARRISSE, *Disc. of N. Am.*, p. 624).
113. (1536.) Heart-shaped map of the world by ORONTIUS FINAEUS. Cart. As. 73.
114. 1536. Portolanos in Biblioteca Barberiniana at Rome, possibly by AGNESE (HARRISSE, *Disc. of N. Am.*, p. 625).
115. 1536—1564. N. pl. XXIV. Portolan-atlases by BATTISTA AGNESE. Cart. As. 75.
- Among anonymous and undated maps we may here mention the splendid portolan-atlas, given by Charles V to Philip II. It was once in the possession of the celebrated collector of antiquities Fr. Spitzer, who,



89. Bay of California by DOMINGO DEL CASTILLO. From Lorenzana. (Size of original 0.85 x 0.805 m.)

106. 1534. FA., fig. 67 and p. 106. A map of the Atlantic and the adjacent littorals of the New World, Europe, and Africa, included in PETRUS MARTYR & OVIEDO, *Historia de l'Indie occidentali*, Vinegia MDXXXIII (0.530 x 0.425 m.). HARRISSE, perhaps without due cause, calls the map "Ramusio's New World". It is uncertain whether this map—of which there is but one copy extant—originally accompanied the above-mentioned work, or was a separate print, which has by chance been bound with it.
107. 1534. GASPAR VIEGAS. A Portuguese map of the Atlantic, now at the National Library at Paris (1.00 x 0.50 m.). G. MARCEL, *Reproductions de cartes et de globes*, Paris 1893, p. 21, pl. 4 and 5. More closely analysed by HARRISSE, *Disc. of N. Am.*, p. 599. First noticed by F. Denis (*Bibl. Am. Vetustissima*, p. 313, footnote).
108. 1535. Four maps concerning America in PTOLEMY, Lugduni 1535, printed from the same blocks as the corresponding maps in Ptolemy 1522.
109. 1535. The map in the Basel edition of REISCH'S *Margarita* of the same year. Cart. As. 71.
- A. E. N. II.

together with Ch. Wiener, published a photographic reproduction thereof with explanatory text, Paris 1875. Besides a richly illustrated title-page, two prints of tables and astronomic diagrams, the work consists of an oval map of the world (resembling the map of the world on pl. XXIV), six pictures embracing the districts of the normal portolano (unaltered copies of corresponding maps from the XIV century) a map of the Indian Ocean, one of the Atlantic, and one of the Pacific. The size of the maps is not given by Wiener, but seems to be about 0.38 x 0.28 m. according to a photographic reproduction in my collection. These maps, as has already been remarked by Major, were probably a product of Battista Agnese's map manufactory and were most probably drawn about 1540. Somewhat older than these, as proved by the less complete mapping of the west coast of North America, is the extremely beautiful portolano in the Royal Library at Stockholm, which though anonymous was evidently drawn by Agnese. Four of these maps are reproduced on pl. XXIV. These entirely agree with corresponding maps in the portolano of Philip II, with the exception that on the last-mentioned California is depicted, whereas the dots have been omitted which in the Stockholm portolano show the north-west passage.

That these two are copies from the same original is also proved by the points of intersection of the rhumb-lines being in exactly the same position on the corresponding maps in both these portolanos.

116. 1538. FA, pl. XLIII. A map in double heart-shaped projection by GERARDUS MERCATOR. Cart. As. 76.

117. 1538. N. fig. 60. Map of Asia, embracing also a part of the north-west coast of America, in SOLINUS, Basileae 1538. Cart. As. 77.

118. 1539. FA, fig. 32 and p. 60. OLAUS MAGNUS' large map of the North. Greenland (Gruntlandia) juts in on the map in two places. The maker of the map supposed that it formed a large continent situated north of the Atlantic, stretching from 84° N. lat. beyond the Pole. For bibliographical information about this map and its literature vide p. 92.

119. (1540.) FA, pl. XL. A German globe-print, possibly by GEORG HARTMANN of Nuremberg, which print has by mistake been identified with Schöner's globe of 1523. Cart. As. 81. This globe-print shows a connection by sea, north of America, between the two oceans; the line of demarcation also is depicted, it being drawn in the interest of Spain west of Malacca and somewhat east of Terra di Baccalaos.

120. (1540.) Anonymous atlas, preserved at the Royal Library at Turin, consisting of 12 maps in octavo, of which some also comprise the New World. The atlas was once in the possession of Cardinal Guido Ascanio Sforza (1534—1564). UZIELLI-AMAT, II, p. 135. Reproduced in part by H. WUTKE: *Zur Geschichte der Erdkunde (Jahresber. d. Ver. f. Erdkunde zu Dresden 1870, Nachtrag)*.

Under Nos. 182 and 183 (p. 135) UZIELLI-AMAT mention two other portolan-atlases from the first half of the 16th century, of which the one is at the Royal Library at Turin, the other at the Bibl. Angelica at Rome; the former consists of 26, the latter of 20 maps. Judging from the description given of these atlases, they seem to be a product of Agnese's map-manufactory in Venice.

121. 1540—1552. Maps comprising America in the different editions of MÜNSTER'S Ptolemy, published in Basel 1540, 1541, 1542, 1545 and 1552. These editions, besides the old maps of Ptolemy, contain a number of Tabulae novae, printed in the different editions from the same blocks. Of these maps, but two, the map of the world (FA, pl. XLIV), and *Novus Orbis* (FA, fig. 73) relate to the New World. Cart. As. 80.

122. 1541. Map of the world by NICOLAS DESLIENS, at the Dresden Library. Cart. As. 82.

123. 1541. Three maps, including America, in PTOLEMY, Lugduni-Viennae 1541, printed from the same blocks as the maps in the Ptolemy of 1522.

124. 1541. MERCATOR'S globe and globe-print of this same year. Cart. As. 84.

125. 1541. N. fig. 89. A map of the Gulf of California and surrounding country, signed: "DOMINGO DEL CASTILLO Piloto me Fecit en Mexico año del Nacimiento de N. S. Jesu Ch[r]isto de MDXLI." The map is here reproduced from a copy in FRANCISCO ANTONIO LORENZANA'S *Historia de Nueva España*, Mexico 1770.

126. 1542. N. fig. 67. Map of the world by HONTER. Cart. As. 86.

127. 1542. N. pl. L. Large, important map of the world by ALONZO DE SANTA CRUZ, in the Royal Library at Stockholm. The legends along the coasts of America are cited pp. 165—176. Cart. As. 87.

128. 1542. A copper globe by EUPHROSYNUS ULPIUS of Italian workmanship. Is now in the possession of the Historical Society of New York. Diameter 0.394 m. As regards the literature, etc., about this important globe vide WINSOR, *Hist. of Am.*, III, p. 214; IV, pp. 19 and 42 (a representation of that part embracing America).

129. 1542. Map of the world in the British Museum, which map formerly belonged to Edward Harley, Earl of Oxford. Cart. As. 88.

130. 1542. Maps in JOHN ROTZ' *Idrography*. British Museum. Cart. As. 89.

131. 1542—1545. Terrestrial globes by CASPAR VOPEL. The map of one of these globes is reproduced in FA, pl. XL. Cart. As. 90.

132. 1543. *Golfo y costa de la Nueva España*. This map was exhibited at the Madrid Exhibition with the erroneous date 1521 (0.630 X 0.410 m.). Described and reproduced by HARRISSE (*Disc. of N. Am.*, p. 643, pl. XXIII).

133. 1544. Map of the world by SEBASTIAN CABOT at the National Library in Paris. The legends along the coasts of America are given in this work pp. 165—176. Cart. As. 91.

134. 1544—1545. Marginal maps in a manuscript at the Bibl. nationale, bearing title: *Cosmographie . . . composee par Jehan Allefonsee et Paullin Secalart cosmographe de Honnefleure*. HARRISSE, Cabot, p. 205. Reproduced by WINSOR (*Hist. of Am.*, IV, p. 74—77).

135. 1544—1578. FA, p. 108, pl. XLIV and fig. 73. MÜNSTER'S Cosmography. Of those maps introduced in the different editions of this work only two comprise America, viz. the new map of the world and "Die neue Inseln so zu unsern Zeiten durch die kunig von Hispania im grossen Oceano gefunden sindt" (edition 1544). They are printed from the same blocks as the corresponding maps in Münster's Ptolemy. None of the hundred or so maps or plans of towns printed in the text (ed. 1550) relate to the countries or towns of the New World.

136. After 1544. *Carta de las Antillas, Seno Mejicano y costas de Tierra Firme y de la América Setentrional*. Anonymous and undated Spanish map (0.60 X 0.44 m.), reproduced in *Cartas de Indias*, Madrid 1877. The map is said to have been drawn prior to 1525; Harrissee however proves that it is later than 1544.

137. (1545.) Anonymous atlas, supposed to be of Portuguese workmanship,* containing 26 maps (0.39 X 0.285 m.), in the Bibl. Riccardiana of Florence, codex No. 1813. Those maps which comprise America are

reproduced by KRETSCHMER, pl. XXXIII—XL. UZIELLI-AMAT, II, p. 266.

RUGE, *Kart. v. Am.*, p. 71.

138. (1545.) *Nova et integra universi orbis descriptio*. A copper globe ("Globe Verrazanian"). Diameter 0.21 m. Described by HARRISSE in *Revue de Géographie* of 1896. Offered for sale by CH. CHADENAT in *Bibliophile Américain*, Jan.—Febr. 1897, for 10 000 francs.

139. 1545. FA, fig. 75. PEDRO DE MEDINA. Chart of the Atlantic.

A rough and badly executed Spanish wood-cut, "valde rudis", as Ortelius says of another map of Medina. A closer description is given in FA, p. 110. More or less improved copies of this chart are introduced in the French (1554), Italian (1554), German (1576) and English (1581) editions of Medina's manual of navigation.

140. 1546. FA, pl. XLIV. Map of the world in JOHAN HONTER'S *Rudimenta Cosmographica*, Tiguri 1546. Also published in the later editions and in other works. Cart. As. 92.

141. 1546. FA, fig. 71. "Regiones et nomina ventorum." In the work by HONTER, mentioned above. Cart. As. 56.

142. 1546. N. pl. LI—LIII. Large map of the world by PIERRE DESCIELIERS. The legends along the coasts of America are already cited pp. 165—176. Cart. As. 93.

143. 1546. Portolano of JOÃO FREIRE, formerly in Baron Taylor's library. Cart. As. 94. Part of this map is reproduced in WINSOR'S *Hist. of Am.*, II, p. 448 from a drawing by Kohl.

144. 1546. Oval map of the world by GASTALDI. Cart. As. 95.

145. 1547. Atlas drawn by hand, signed NICHOLAS VALLARD. Cart. As. 96.

146. 1548. Maps by GASTALDI in Ptolemy, Venetiis 1548. Besides the maps of the world in this edition of Ptolemy there are the following maps which treat of the New World:

- 1) *Tierra nova*, South America;
- 2) *Nueva Hispania*, North America;
- 3) *Tierra nueva*, Labrador and Canada;
- 4) *Isola Cuba nova*;
- 5) *Isola Spagnola nova*.

These small maps (about 0.17 X 0.13 m.) are very fine copper-plates, and together with the *Universale novo* and *Carta marina Nova Tabula* occurring in the same work form the very first atlas of the New World. The maps are signed in all four corners with a "G.", probably for Gastaldi, and as the rubrics of the maps denote, seem partly to be founded on Spanish originals. Cart. As. 97.

147. (1550.) "Queen Christina's Portolano." Anonymous map of the Agnese type, belonging to Count Axel Mörner of Espelunda. It consists of 9 sheets of parchment, folded in the middle, which form an atlas of 18 leaves, bound in red leather with gold impressed ornament (0.254 X 0.169 m.). Besides an astronomical table, the representation of an armillary sphere, and a diagram of cosmos according to the pre-Copernican idea, the work contains the usual oval map of the world with the ocean routes, maps of the Atlantic, Pacific, and Indian Oceans, a map of Scandinavia, one of Central Europe, maps of the normal portolano district, and a map of the Old Hemisphere. On the first page it is written that the book was given by Haller von Hallerstein to "Dno Sebastiano Archiepiscopo Moguntino". A Sebastian von Heussenstamm was Archbishop of Mainz 1545—1555. On the inner side of the front cover there is: "Christina Regina Sveciae. Tenna bock hawer min praeceptor mig giwit . . . A:o 1637." On the inner side of the back cover there is a round cavity intended for a compass and surrounded by a compass rose. The work coincides in almost every detail with the description given by UZIELLI-AMAT (*op. cit.* II, p. 132) of an Agnese map, signed and dated 1546, in the Grand Ducal Library at Gotha. The oval map of the world and the ocean maps are exactly similar to the corresponding plates in the portolano of Philip II and to the maps reproduced in this work on pl. XXIV.

148. 1550—1563. N. pl. XXV and XXVI. Portolanos by CALAPODA. Some of them embrace the New World, e. g. that of 1552 reproduced here and a map of 1563 in St. Mark's Library, Venice, the American part of which has been reproduced by KRETSCHMER, pl. XXII. Cart. As. 98.

149. 1550. Map of the world in the British Museum, by PIERRE DESCIELIERS. Cart. As. 99.

150. 1550. DIEGO GUTIERREZ. Map drawn on parchment and signed: "Diego Gutierrez, Cosmographo de Su Magd., me fizo en Sevilla año de 1550" (1.30 X 0.85 m.). Dép. de la Marine, Paris. G. MARCEL, *Reproductions de Cartes et de Globes*, Paris 1893, p. 109, pl. 31—34.

151. (1550?) Anonymous map engraved in Rome(?) of that part of North America lying north of Lat. 28. *Catalogue of printed maps . . . in the Brit. Museum*, London 1885, col. 87.

152. (1550.) N. fig. 74. Globe at Nancy of gilded silver. Cart. As. 101.

153. (1550.) FA, fig. 69. A large and very interesting map of the town of Mexico and its environs, drawn by ALONZO DE SANTA CRUZ, and now at the University Library at Upsala. It is reproduced on a greatly reduced scale in FA, fig. 69. A full-size reproduction was exhibited in the Swedish department of the Madrid Exhibition in 1892.

154. 1552. FA, pl. XL. Print of a globe by FRANCISCUS DEMONGENET. Cart. As. 102.

155. 1553. Map of the world by PIERRE DESCIELIERS. Cart. As. 104.

156. (1553.) Portuguese planisphere at Dépôt de la marine, Paris. Cart. As. 105.

157. (1553.) FA, fig. 48. FLORIAN'S map of the world. Cart. As. 106.

158. 1553. Map in NICOLAS DE NICOLAY'S *L'Art de naviguer de Pierre de Médine*, Lyon 1553 (0.3 X 0.2 m.). HARRISSE, Cabot, p. 240.

* Are all the maps, which on linguistic grounds are supposed to be Portuguese, really from that country? I prefer to think that seacharts drawn by inhabitants of the Iberian peninsula used a skipper's dialect common to Majorca and the coasts of Spain and Portugal, and that this perhaps acquired the greater part of its vocabulary from that country where ocean-navigation first developed and therefore is more like Portuguese than Spanish.

This map I have not seen, but suppose that it agrees with the large map by the same author, which, with the title *Navigazioni dil mondo nouo* was printed in Venice 1560 and is reproduced here pl. XXVII.

159. 1554. N. figg. 65 and 66. Map of the world, divided into two hemispheres, engraved on copper by JULIUS DE MUSTIS at Venice 1554. Cart. As. 107.

160. After 1554. An anonymous and undated map of the Orinoco and Amazon Rivers, drawn by hand (0.63 x 0.44 m.), reproduced in *Cartas de Indias*, Madrid 1877.

161. 1554. N. fig. 75. Map of the New World, published by JOH. BELLERUS, a printer in Amsterdam, and inserted in DARINEL's *La sphaere des deux mondes*, as also in editions of GOMARA: *Hist. general de las Indias*, CIEZA DE LEON: *Chronica del Peru*, and LEVINUS APPOLLONIUS: *De Peruviae regionis . . . inventione*, published at Antwerp 1554—1567.

162. 1555. Map of the world in Honters' style in DARINEL's *La sphaere des deux mondes*. Cart. As. 108. This map has also been inserted in other geographical works from the middle of the 16th century (WINSOR, *The Kohl Collection*, p. 16).

166. 1556. FA, pl. XLV. Map of the world by HIERONYMO GIRAVA copied from Caspar Vopel. Cart. As. 111.

167. 1558. Heart-shaped map of the world by CASPAR VOPEL in the Hauslab-Lichtenstein collection at Vienna. Cart. As. 112.

168. 1558. Manuscript atlas by DIEGO HOMEN. Cart. As. 113. In KOHL's *History of the discovery of Maine*, pl. XV, there is part of a map (North America) "made about 1540" by Homen. The original is in the British Museum. Diego Homen or Homem was, like Agnese and Maiolo, one of the most diligent and able makers of maps of the sixteenth century. Many of his works that are counted among Americana, seem however only to have comprised the district of the normal portolano. Compare above p. 67.

169. 1559. Atlas drawn by hand by ANDREAS HOMO, Cosmographus Lusitanus. Cart. As. 114.

170. A Turkish map of the world, cut in wood at Venice by HHÄGGV AHMED of Tunis; a copy of Orontius Finaeus' heart-shaped map of the world. Comp. FA, p. 80.

171. (1560.) FA, fig. 54. MERCATOR's double heart-shaped map of 1538, re-engraved on copper at Rome by Ant. Lafreri. Cart. As. 76.



90. The Atlantic by FERANDO BERTELI, about 1565. (Size of original 0.357 x 0.24 m.)

163. 1555. Various manuscript maps in GUILLAUME LE TESTU's *Cosmographie Universelle* etc. Cart. As. 109.

164. 1556. Maps and plans of towns relating to America, inserted in the third volume of RAMUSIO (*Delle Navigazioni et Viaggi*), viz: Isola Spagnuola, Mexico (differing greatly from the Santa Cruz' map at the Upsala University Library, FA, fig. 69), "Il Cuscho citta principale della provincia del Peru", La Nuova Francia, Brasil and "Universale della parte del mondo nuovamente ritrovata" (N. fig. 76). Cart. As. 100. That Gastaldi's maps are based on originals procured by Ramusio is proved by his "Discorso all' Eccellente M. Hieronimo Fracastoro", dated 1553, inserted in RAMUSIO, III, Fol. 4 verso.

165. 1556. Portolan-atlas, by ANGELUS EUFREDUTIUS, which also includes the New World. Cart. As. 110.

172. 1560. N. pl. XXVII. *Navigazioni dil mondo nouo* by "NICOLLO DEL DOLFINATTO cosmographo del christianissimo Re". A fine copper print, executed in Venice by PAULO FORLANI for the celebrated French geographer Nicolas de Nicolay. — An almost unchanged copy of this map engraved by BERTELI was published in Venice about 1565. This is reproduced in fig. 90 (Compare above p. 72).

173. 1560. N. fig. 77. Oval map of the world by GASTALDI, published by Forlani. Cart. As. 115.

174. 1560 (1526). *Tierra que descubrio el piloto Estevan Gomez*. Map-sketch in a MS. by ALONZO DE SANTA CRUZ: *Islario General del Mundo*, in the Imperial Library at Vienna. This manuscript dates from the year 1560, but the original of the map was probably drawn in 1526 (HARRISSE, *Disc. of N. Am.*, pp. 234, 621 and pl. XI).

XV.

The Pacific.

The Ancients knew but little of the largest ocean of the globe, now called the South Sea or the Pacific. So long as the ocean, in agreement with the views of Herodotus, was thought to be a connected expanse of water surrounding the inhabited world, Eastern Asia also was supposed to be bounded by this world-sea; and when the spherical form of the earth became an accepted theory, this ocean was generally considered to fill the space between the west coast of the Iberian peninsula and the eastern countries of Asia. The cosmographers however were far from agreeing in this point of fundamental importance for their geographical system, and some of them, probably including Hipparchus, denied the connection between the different oceans. Ptolemy considered the Indian Ocean as an inland sea bordered on the west by Africa, on the north by Asia, and on the south and south-east by an unknown southern land, the germ of the "Terra Australis incognita", which still haunts the maps of the 18th century. Beyond 180° E. longitude reckoned from Insulae Fortunatae, he makes the known world limited by unknown tracts of land. Notwithstanding the fact that on maps of the type afterwards ascribed to Macrobius, Asia is depicted as surrounded by sea, it can scarcely be said that any reliable information about the largest ocean of the world had penetrated to the civilized nations of antiquity. During the first thousand years of the Christian Era this knowledge was not increased, except in so far as vague rumours of peoples and countries on the Asiatic shores of the Pacific reached Europe through Arabian merchants and scholars. During this time of intellectual darkness and inactivity, two novelties, stamped with the spirit of the age, were introduced in the cartography of Eastern and Northern Asia. Far to the east in Asia, on about the same latitude as Palestine, Paradise was depicted, marked by a suitable image of the tree of knowledge and the first sinning pair (compare *e. g.* fig. 3, Beatus' map of 8th century; fig. 5, Haldingham's of 13th; and fig. 7, Andrea Bianco's of 15th). The Garden of Eden is therefore the first geographical detail which meets our eye on maps of the west coast of the Pacific or east littoral of Asia. In the North, Gog and Magog's country is represented in the maps of the Middle Ages.¹

Fully reliable information concerning the oceanic boundaries of Asia in the far east was not obtained until the 13th century through the emissaries from the Pope to the Mongol rulers. Thus, at the court of Karakorum, Rubruquis (1254) met a French goldsmith who related that the Great Khan received tribute from a people inhabiting islands in the east (Saghalien?, Schantar Islands?), where in winter the sea was frozen. He also learnt that Cathay was close to the ocean.

The real European discoverer of this great ocean is Marco Polo. In the second and third chapters of his third book he speaks of the large and wealthy island of Chipangu

(Japan) that is in this ocean, and describes Kubla-Khan's unsuccessful attempt to conquer it; in chapter 4 he mentions a sea, Chin, in which this island is supposed to lie, and expressly states it to be but a part of the ocean. Finally in the following chapters of the same book he speaks of the large islands, lying in a bay of this sea, called Java, Sondur and Condur, Pentam, Java minor, Necuveran, Angamanain, and Seilan. These islands are depicted on Behaim's Globe (FA, fig. 40), on the Laon Globe (FA, fig. 41), on Ruysch's map of 1508 (FA, pl. XXXII), on Tabula Moderna Indiae Orientalis in Ptolemy 1522 (FA, figg. 62 and 63), and many more maps dating from the commencement of the 16th century. It must be remembered that all these maps—as far as the part of Austral-Asia is concerned—are founded exclusively on Marco Polo's accounts of his travels. However no definite statement concerning the relative position of these islands is given by Marco Polo, and this has caused great mistakes on those maps, generally of the Ptolemaic type, where these islands are depicted. Angamanain and Necuveran, by which Marco Polo probably designates the Andaman and Nicobar Islands, are placed east of the East Indian peninsula, as also Ceylon. The latter mistake more especially caused great confusion for a long time in the cartography of the Indian Ocean.

From the West the Pacific was first discovered by Vasco Nuñez Balboa.² He was one of the many Spaniards of good family, but small means, who sought a fortune as conquistadors in the New World. After spending some time on Hayti he took part in Martin Fernandez Enciso's expedition to the mainland. Here he soon ousted Enciso from his command, and by his courage and ability eventually became the leader of a colony, called Santa Maria del Antigua at the mouth of Rio Darien. During one of the many expeditions undertaken from this spot to the interior of the country in search of gold, Balboa visited one of the Indian chiefs of the country. Seeing a dispute arise among the Spaniards concerning the gold he had given them during the festivities, the chief declared that this metal was to be found in great abundance in a country which could be reached by sea on an ocean that was but six day's journey from where they then were. Balboa's one aim in life now was to set foot on this land of gold, and first of all to reach the sea leading thereto. His first journey across this isthmus was begun on Sept. 1st 1513. One hundred and eighty Spaniards and about a thousand natives formed the expedition. On Sept. 25th those mountain heights were reached from which the sea could be seen on the other side. The isthmus of Panama, at that spot where it was first crossed, runs almost east and west. The sea then discovered therefore lay south of the mountain heights whence it was first viewed by the Europeans. It was therefore called "Mar del Sur" (The South Sea), not a very correct name, which after Magellan's

¹ The origin of these names with the fables attached thereto may be found in EZEKIEL chapters 38 and 39 as also in Revelation. The Coran also mentions in various places these enemies to Judaism, Christianity, and Islam.

² Owing to want of space it is only exceptionally that I can to the extensive, but, nevertheless, often very incomplete original literature give any accounts of the earliest voyages of discovery in the Pacific. I must refer the reader to the works of HARRISSE, HUMBOLDT, KOHL, LELEWEL, PESCHEL, RUGE, WINSOR, VIVIEN DE ST. MARTIN etc., often quoted in this book, as also to NICOLAES WITSEN, *Noord en Oost Tartarye*, second edition, Amsterdam 1705; CLARET FLEURIEU's introduction to ETIENNE MARCHAND'S *Voyage autour du Monde*, Paris an VI; JAMES BURNEY, *A chronological history of the discoveries in the South Sea*, 5 vol. 4:0, London 1803—17; MARTIN FERNANDEZ DE NAVARRETE, *Coleccion de los viages y descubrimientos que hicieron por mar los Españoles desde fines del siglo XV*, 5 vol. 4:0, Madrid 1825—37; W. S. W. VAUX, *The world encompassed by Sir Francis Drake (Works issued by the Hakluyt Society, London 1854)*; R. H. MAJOR, *Early voyages to Terra Australis* (ibid., London 1859); LORD STANLEY OF ALDERLEY, *The first voyage round the world, by Magellan* (ibid., London 1874); FRANZ WIESER, *Magalhães-Strasse und Austral-Continent*, Innsbruck 1881; ARMAND RAINAUD, *Le Continent Austral*, Paris 1893.—For his comprehensive and masterly history of the voyages of discovery in the South Sea, Admiral Burney, thanks to Alexander Dalrymple, had access to the important geographical literature of Spain.

voyages was exchanged by some geographers for the scarcely more correct "Mare pacificum". The name "Mar del Sur" had moreover some influence on cartography, since it could be taken as a confirmation of the supposition that a broad belt of land connected north-eastern Asia with north-western America. On some maps the Pacific is designated "Oceanus orientalis" or "Oceanus Indicus orientalis" (Reisch 1515, Mercator 1538), as also "Oceanus Magellanicus" (Vopel 1543, Ptolemy 1561, Myritius 1590).

The description of the enthusiasm with which the discovery of the South Sea was hailed by Balboa and his companions, and the manner in which the new ocean and the countries along its coasts were taken possession of for "Castille and Leon", prove that Balboa fully understood the importance of his discovery. His fate was a tragic one, as although he received the title of "adelantado", and was nominated commander of the ocean he had discovered, a new governor of the isthmus of Darien was appointed simultaneously,

During this same period, however, Spain had equipped a new expedition, which was destined to excite still more sensation among the civilized races of Europe than the crossing of the isthmus of Panama. This was Magellan's voyage round the world, or rather his discovery of those straits which in the south connect the two oceans with each other, his voyage right across the Great Ocean, and the accomplishment of the first circumnavigation of the globe after Magellan's death, under Elcano's command. Before I proceed to give the chief data gained from this voyage I must remind the reader that a rumour of the existence of the Pacific, of the isthmus of Panama, and of a communication by sea between the two oceans south of the most southerly point of the New World, must have reached Europe previous to Balboa's journey. This is made clear by the recently discovered map by Glareanus of 1510 (N. fig. 82) probably copied from a lost globe and map by Waldseemüller, and also by Stobnicza's map published in Cracow, 1512 (FA, pl. XXXIV).



91. Map of the Pacific by GLAREANUS, previous to 1520. From A. Elter (excluding two long inscriptions). Size of original 0.216 x 0.150 m.

and with him the bold, but probably very arbitrary and anything but law-abiding, conquistador was constantly at daggers drawn, with the result that Balboa and several of his followers were beheaded in 1517. He had at that time just been engaged in fitting out an armed flotilla for further discoveries and privateering expeditions to the coasts of the newly discovered ocean.

In his *Historia general* (part. III, cap. 3) OVIEDO enumerates "los cavalleros é hidalgos y hombres de bien", who followed Balboa in his first journeys across the isthmus. After Vasco Núñez in this list comes the name of the priest Andrés de Vera, and after that the name of Francisco Pizarro. He it was who together with Diego Almagro, eight years after Balboa was beheaded, carried out the plan of conquering the land that lay to the south of Darien and was said to be so rich in gold and silver; and during these expeditions for conquest and plunder, a good part of the west coast of South America was mapped.

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On these maps, drawn a decade previous to Magellan's voyage the chief characteristics of the American continent are far more correctly represented than on a number of official maps from 1520 to 1550. This must be owing, so far as the isthmus of Panama is concerned, to accounts given by the natives, and, as regards ocean communication in the south, to private freebooting expeditions, such as are never, or but imperfectly, entered on the pages of history.

It was, however, by Magellan's voyage that exact information was first obtained concerning the extent of the new continent towards the south and the range of the new ocean. Magellan or, as the name is written in Spanish, Hernando de Magallanes, was a Portuguese by birth. Under the Portuguese flag he had served his country with honour both by land and sea in India (about 1510) and Africa. Having obtained a position at court, for some slight cause he quarrelled with the king, which finally induced him to go to Spain together with Ruy

Faleiro, the cosmographer, who also deemed he had cause for dissatisfaction. These two had formed a plan for a south-west passage to the Moluccas, which were supposed to lie on the Spanish side of the line of demarcation or boundary-line, which, by the wisdom of the Pope, had been laid down between the Spanish and Portuguese possessions. If the Moluccas belonged to Spain, it was of importance to reach these islands without sailing in Portuguese waters or touching at their harbours.¹ The plan met with approval from Charles V. On March 22nd, 1518, a formal contract was drawn up in which Magellan and Faleiro were nominated captains of the armada to be equipped for the purpose. Faleiro was afterwards passed over and took no part in the voyage. Magellan himself had many difficulties to surmount before the great enterprise came to anything, as Portugal protested, and the Spanish authorities were inimical to strangers. Among those who in every possible way aided Magellan, history must not forget to mention Cristobal de Haro, a rich merchant with numerous agents in Portuguese India. He had also left Lisbon in displeasure, at the same time as Magellan.

Five vessels were at last equipped for the expedition with great care, and on Sept. 20th, 1519, left San Lucar de Barra-



92. The Ladrões by FIGAFETTA, about 1522. (Orig. size 0.15 x 0.14 m.)

meda at the mouth of the Guadalquivir. They were the *Trinidad*, 110 toneles,² under command of "Capitan mayor de la Armada", Hernando de Magallanes; *San Antonio* of about the same size under command of Juan de Cartagena; *Concepcion* 90 toneles, commander Gaspar de Quesada, next in command Juan Sebastian d'Elcano; *Victoria* 85 toneles, commander Luis de Mendoza; *Santiago* 75 toneles, commander Juan Serrano. The crews consisted in all of 265 hands, most of them Spaniards, about thirty Portuguese, as many Italians, mostly from Genoa and Savona, a few Frenchmen and Netherlanders, a couple of Germans, an Englishman and a negro. On board the *Trinidad* there was also "Antonio Lombardo"

(Pigafetta), who on his return home gave an account of the voyage, comprehensive enough but showing little knowledge of navigation. The equipment of the expedition was carefully undertaken, as proved by the original documents published by Navarrete from the Indian Archives at Seville. The entire cost of the expedition amounted to 8 334 335 maravedis (about 123 000 francs). Of this sum Cristobal de Haro contributed 1 880 126 (about 28 000 francs). After having anchored in a bay at the mouth of Rio Janeiro, and sailed up the broad embouchure of the La Plata and into several other deep bays on the coast, under the impression that the passage was at one or other of these places, Magellan on March 31st, 1520, arrived at Port St. Julian, the latitude of which was found to be 49° 16' S. The disagreements, which from the very first had prevailed on board the armada in consequence of jealousy between the Spanish and Portuguese commanders, at this place broke into open mutiny. This rebellion was suppressed with vigour and severity by Magellan. Luis de Mendoza was stabbed, Gaspar Quesada decapitated, and Juan de Cartagena, together with a priest, Pedro Sanchez, was left stranded on the uninhabited coast. One of the vessels, the *Santiago*, was lost during a reconnoitering excursion towards the south. The four remaining vessels continued their voyage on August 24th but anchored once more on the south-eastern coast of America at the mouth of the River Santa Cruz, according to Pigafetta in 50° 40' S. lat. Leaving this place on October 18th, three days afterwards in 52° S. lat. they reached the cape Las Virgines,³ which in the north-west bounds the long-sought-for strait. More than a month was spent in investigating and sailing through the straits. The cape which in the south bounds the west entrance was called Cape Deseado. Instigated by the navigator Estevão Gomez,⁴ the crew of the *San Antonio* forced their commander when in the newly discovered straits to desert and return to Spain. With the three remaining vessels (the *Trinidad*, the *Victoria*, and the *Concepcion*) on November 28th Magellan sailed out on the Pacific. On January 24th, 1521, they sailed past a well-wooded uninhabited island in 16° 15' S. lat., which they called San Pablo, and on February 4th in 11° 15' S. lat. passed another which was named Los Tiburones. Together they were designated by the name Los Deventurados. Pigafetta, whose nautical knowledge seems to have been extremely small, gives 15° and 9° S. lat., as the position of these islands. They were the first oceanic islands to be discovered in the Pacific, and the only ones Magellan came across before arriving at the Ladrões, but they cannot with certainty be identified with any known islands.⁵ On the other side of the Great Ocean "Islas de las velas Latinas", or the Ladrões, were reached on March 6th, and on the 16th of the same month appeared the islands Zamel and Suluan (10° 43' N. lat.) belonging to the large group of islands afterwards called the Philippines. On April 7th Magellan reached the island Zebu, with the natives and ruler of which he soon stood on a very friendly footing. Unfortunately the Spaniards got mixed up in the quarrels of the natives, and during a fight, in which they engaged in consequence, Magellan and seven of his men were killed on the small island Matan near Zebu. Relying on the superiority of the European weapons, Magellan, in opposition to the advice of Juan Serrano, had engaged in this conflict so as to render assistance to one of the kings of Zebu, who, a short time previously,

¹ In the first chapter of HERRERA'S *Historia general de los Hechos de los Castellanos en las Islas y Tierra firme del Mar Oceano*, Madrid 1601, it is stated that the line of demarcation goes from a place 40 degrees west of the meridian of Toledo to Malacca. As the difference of longitude between Toledo and Malacca (across the Pacific) is about 254°, there is a mistake of 34° in the longitude adopted for Malacca.

² The burden of the vessels is given by Navarrete in "toneles". 10 "toneles" correspond to 12 "tonneladas" or close upon 12 tons.

³ The names Port St. Julian, Santa Cruz, and Las Virgines are placed on maps of the present day in 49° 30', 50° 11', 52° 20' S. lat.

⁴ Estevão Gomez was by birth a Portuguese. After his return to Spain he became the leader of the north-west passage expedition of 1525, during which a stretch of coast named after him on the east coast of North America was mapped. He had also for a short time been a Spanish delegate at the conference in Badajoz.

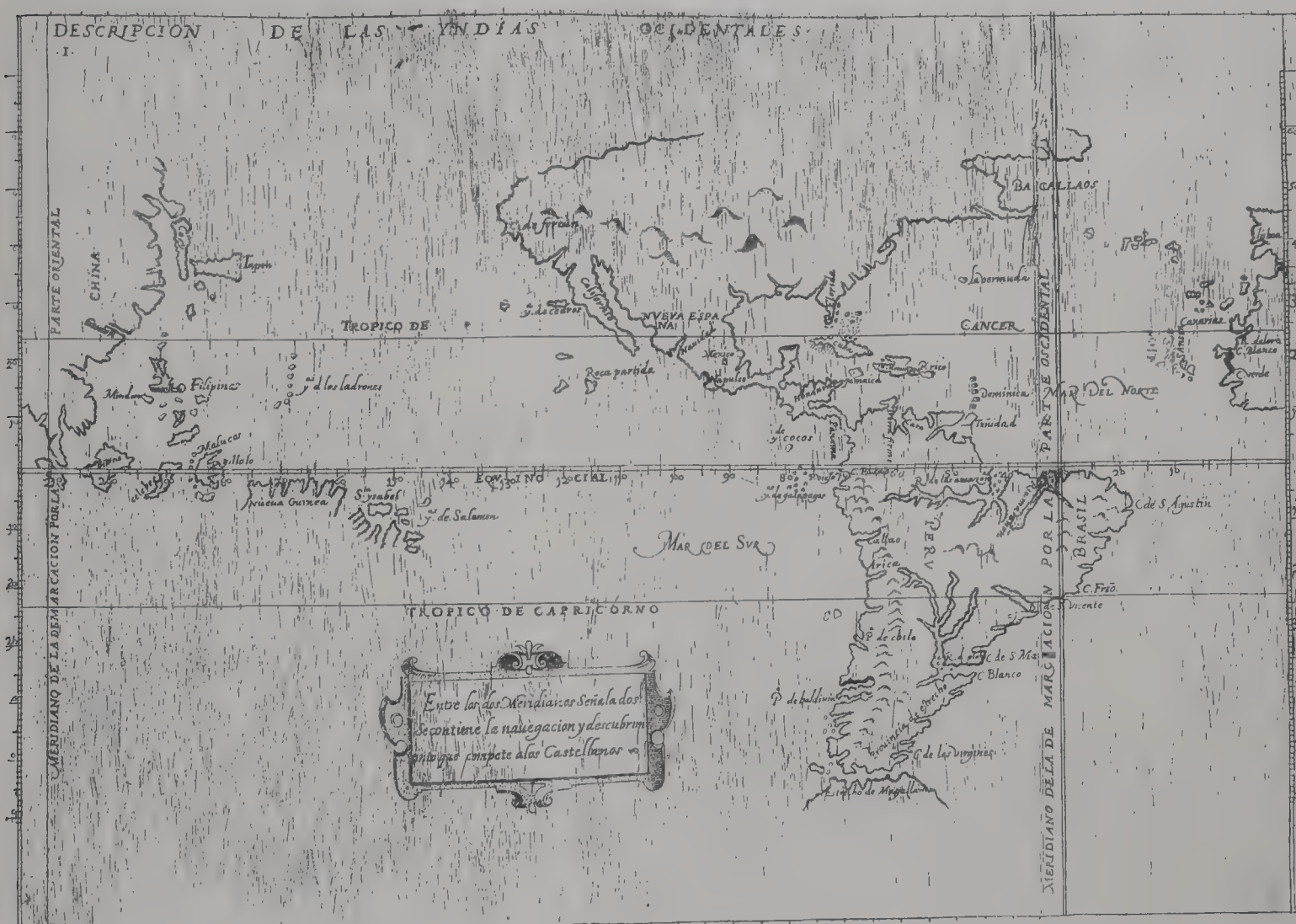
⁵ In *Die Inseln des Stillen Oceans*, Leipzig 1875, Professor CARL E. MEINICKE identifies the island of San Pablo with the island Pukapuka in the Paumotu archipelago, and Isla de los Tiburones with Flint island in the Manihiki group. The geographical position of these islands is: Pukapuka 17° 26' S. and 138° 23' W., Flint 11° 26' S. and 151° 44' W. BURNETT (Vol. I, p. 55) reckons San Pablo as 16° 15' S. and 158° W., and the Tiburones as 11° 15' S. and 169° W.

had been, in a few hours, converted by the Spaniards to Christianity together with all his people. This conversion however did not last many days, for immediately after the fatal conflict at Matan the newly christened ally—in whose cause Magellan had sacrificed his life—tried to seize the vessels. For this purpose, on May 1st, he enticed the new commander Duarte Barbosa and Juan Serrano into landing and killed or captured both them and their followers, in all 27 men, among them the Frenchmen "Piti Juan" and Simon de la Rochela. The vessels however succeeded in weighing anchor in time and sailed on. The crews were now so reduced in number that they were obliged to abandon one of the vessels, the Conception. The two remaining ships continued their voyage, and after all kinds of adventures and conflicts reached Tidor on November 8th. Here a long stay was made so as to take in a cargo of spices. When at last all was ready for the start, one of the vessels was found to be

menore, Juan de Arratia, Juan de Santander, Vasco Gomez Gallego, Juan de Zubileta, Antonio Lombardo. These were the first circumnavigators of the globe.

During the two centuries after Magellan's and Elcano's voyage, the circumnavigation of the globe was considered a great marine exploit. But twelve are known from those times, viz:

Magellan¹ and Elcano 1519—1522, Sir Francis Drake 1577—1580, Sir Thomas Cavendish 1586—1588, Olivier van Noort 1598—1601, Joris Spielbergen 1614—1617, Wilhelm Corneliszoon Schouten and Jacob Le Maire (round Cape Horn) 1615—1617, Jacob l'Hermite och Gheen Hugo Schapenham 1623—1626, John Cooke, Ambrose Cowley and William Dampier 1683—1691 (remained for some time in the Spanish American water as bucaniers), Funnell 1703—1706, Woodes Rogers and Stephen Courtney 1708—1711, John Clipperton 1719—1722, George Shelvocke 1719—1722.



93. Map of the Pacific by HERRERA, 1601. (Size of original 0.325 x 0.230 m.)

unseaworthy. The Victoria was therefore obliged to continue the voyage alone under Elcano's command; she discovered Amsterdam Island on March 18th, 1522, doubled the Cape of Good Hope on May 18th, arrived at the Cape Verde Islands on July 9th, and anchored in the harbour of San Lucar on September 6th of the same year.

Of the 265 men who three years previously had sailed from the same port, there now survived but 18, viz. according to NAVARRETE (Vol. IV, p. 96): Juan Sebastian de Elcano, Francisco Albo, Miguel Rodas, Juan de Acurio, Martin de Yudicibus, Hernando de Bustamante, Aires, Diego Gallego, Nicolao de Nápoles, Miguel Sanchez de Rodas, Francisco Rodriguez, Juan Rodriguez de Huelva, Anton Hernandez Col-

The first circumnavigation of the globe was hailed with joy not only by the Spanish nation and king, who hoped that they had at last found the way, which since 1492 had been so eagerly sought for, to the treasures of India, but also far beyond the Spanish frontiers. The spherical form of the earth had indeed for some time been proved by geographers and accepted by the learned world after much hesitation, but this was the first palpable proof thereof. The final judgment was thus given in a conflict which had been carried on between Church and Science since the time of Augustine. It was, says RAMUSIO (II, fol. 46 v.), "una delle piu grandi et marauigliose cose, che si siano intese à tempi nostri: & anchor che in molte cose noi superiamo gli antichi, pur questa passa

¹ Magellan was the first to circumnavigate the earth; for, when in the Portuguese service, he had reached the Moluccas from the east, while ten years later, when under the Spanish flag, he arrived there from the west.

di gran lunga tutte l'altre insino à questo tempo ritrouate". The commander of the sole returning vessel and the crew were richly rewarded by Charles V. Their samples of goods, and their description of the "Indian" islands and their wealth caused a great sensation and seemed to promise so great a commercial gain that it was immediately determined to send out a new expedition to the Moluccas along the route discovered by Magellan. This consisted of seven vessels of a burden varying from 50 to 300 toneles, which sailed from Corunna on July 24th, 1525. The vessels were manned by 450 men under the command of Fr. Garcia Jofre de Loaisa (or Loyasa). Elcano accompanied the expedition as "Piloto mayor y guia." This second voyage across the Pacific was very unfortunate. Three vessels were lost before the Straits of Magellan were passed. While tacking off the entrance, one of the vessels commanded by Francisco de Hoces had been driven by storms so far south that they believed they saw the last of the land (first discovery of Cape Horn?). The remaining four vessels sailed through the Straits of Magellan and reached the Pacific Ocean on May 26th, 1526. But at a distance of 157 leagues (*vide supra* p. 24) from Cape Deseado (47° 30' S.) a violent storm arose which scattered the fleet. The flag-ship Santa Maria de la Victoria continued the voyage on a north-west course, but a terrible disease, probably scurvy, had broken out among the officers and crew. Loaisa died on July 30th and Sebastian Elcano, who, when his own vessel was lost in the Straits, had gone on board the flag-ship, now took command, but died himself on August 4th. On August 22nd they passed the only island seen on their crossing, a wood-encircled lagoon, which was named San Bartolomé. Its south coast lay in 14° 2' N. lat. The Ladrões were reached on September 4th, and the Philippines (Mindanao) early in October. At this place the Spanish seamen were soon involved in the intrigues and conflicts with the natives and the Portuguese, which were precursors to the conquest of these islands by Europeans. The vessel was abandoned, most of her crew dying of disease or in fight, and the few survivors returning home on Portuguese vessels.

Besides the flag-ship Santa Maria de la Victoria, another of the vessels of Loaisa's squadron had a remarkable voyage, this being the Santiago, a galleon of 50 toneles, under the command of Santiago de Guevara. She was one of the vessels which after sailing into the Pacific was separated from the flag-ship. Guevara, being thus thrown on his own resources, could not continue his course across the ocean, owing to want of victuals and water, but was obliged to seek a nearer port on the west coast of New Spain, lately discovered and colonized by Cortez. After many difficulties and hardships the Santiago reached this coast and was therefore the first vessel, and Santiago de Guevara the first commander, that sailed up to the west coast of North America from Europe through Magellan's Straits.

Even before Magellan's voyage cartographers had depicted the southern division of the New World as a continent jutting out in a point, the extreme edge of which was sometimes drawn as surrounded by water, sometimes, on maps now lost, as bounded by a strait which separated the American mainland from the continent supposed to surround the South Pole. Magellan himself, during the many disputes he had with his navigators and officers, appealed to maps and globes as proving that such a strait really existed. He never seems to have doubted but that there was a South Polar Continent. Here he adhered to a common geographical article of faith among cosmographers from the first part of 16th century, which faith was founded partly on theoretical speculations, partly on Ptolemy's drawing of the land south of the Indian ocean, on "Regio Patalis" in Plinius, Roger Bacon, and d'Ailly, and possibly on vague accounts of some Portuguese skipper driven by storms to some antarctic isle, plentifully supplied with sea fowl,

in the Atlantic or Indian Ocean. On that part of Terra Australis opposite Africa there may be read: "Psitacorum regio, sic a Lusitanis appellata ob incredibilem earum avium ibidem magnitudinem" (ORTELIUS 1570, FA, pl. XLVI) and "Lusitani bonæ spei legentes capitis promontorium hanc terram austrum versus extare viderunt, sed nondum imploravere" (DE JUDAEIS 1593, FA, pl. XLVIII). The former legend seems to me to be a reminiscence of the quantities of large sea-fowl of different kinds that are found in the Antarctic countries. The Austral continent is, however, not marked on any dated map or globe previous to the return to Spain of the earliest circumnavigators. The globe by Schöner, considered to have been drawn in 1515, and Da Vinci's supposed map (about 1519) on which the South Polar continent is marked, are neither of them dated.

After the discovery of Tierra del Fuego, the existence of such a continent was considered fully proved by most geographers. It is drawn to its full extent on many of the maps of the world of the 16th century *e. g.* on the maps by Franciscus Monachus 1527 (N. fig. 41), by Orontius Finaeus 1531 (FA, pl. XLI), by Mercator 1538 (FA, pl. XLIII), on the later works by Mercator, de Judaeis, Myritius and others. Some careless imitations of older types of maps form an exception, where no land is depicted south of the southernmost point of America, *e. g.* Münster's maps of 1540 (FA, pl. XLIV and fig. 73), Gastaldi's of 1548 (FA, pl. XLV), and maps by Battista Agnese. These maps only depict a large island opposite the Straits of Magellan, but no South Polar continent. On Hakluyt's maps of 1587 (FA, fig. 82) and of 1599 (FA, pl. L), on the other hand, evidently owing to information received from Drake, Tierra del Fuego is represented as a group of islands of comparatively small dimensions.

The Austral continent is usually mapped as occupying that part of the surface of the globe situated between the South Pole and the South Polar Circle. Three considerable projections jut out thence, one towards the Straits of Magellan, one towards Africa, and one into the Pacific. The last-mentioned is the largest and ends with a vast peninsula, the position of which corresponds to that of the present Australia. This continent is generally designated with a name borrowed from maps of the Macrobius type, *Terra australis incognita*, which has however not prevented its being provided with many names and long inscriptions, such as may be seen on the above-mentioned map of the world by de Judaeis, on Quad's map of 1608 (FA, pl. XLIX) among others.

The map of that part of the globe where Terra Australis and America are only separated by a narrow strait, was for a long time kept unaltered, just as it was drawn on the first Spanish maps after the circumnavigation, *e. g.* on the anonymous map of 1527 now in the Library at Weimar, and on Ribero's maps of 1529 at Weimar and in the Propaganda Archives (N. T. XLVIII and XLIX). The mainland is here called "Tiera de Patagones" or "Tiera de Fernam de Magallanes"; the strait "Estrecho de Fernam de Magallanes." On the Spanish map of 1527 (FA, pl. XLI) sent to England by Thorne, the strait is called "Strictum omnium sanctorum." Orontius Finaeus' map of 1531 (FA, pl. XLI) is the first printed and dated map, on which the strait discovered by Magellan is entered. It is nameless, but the vast and new ocean to which the straits lead, is called "Mare magellanicum." This type remained almost unchanged until the discovery of Cape Horn. That the drawing was totally incorrect had however been proved during Drake's circumnavigation of the globe 1577-79. Driven out of his course by storms, when tacking off the west coast of Tierra del Fuego and Patagonia, he found that Tierra del Fuego did not consist of one connected landmass but that it was a group of islands, as also that the west coast of South America north

of Tierra del Fuego had neither the breadth nor the large projection towards the west which previous maps had represented. Both these corrections are introduced on the map dedicated to Hakluyt in 1587, and inserted in the Paris edition of Petrus Martyr of this same year (FA, fig. 82), as well as on the beautiful map, drawn in Mercator's projection, in HAKLUYT'S *Principal Navigations* of 1599 (FA, pl. L)¹ as also on an undated map by Jodocus Hondius drawn probably about 1590 and reproduced by W. S. W. VAUX (*The world encompassed by Francis Drake*, Hakluyt Soc., London 1854). From this map also the Magellan Straits were copied by J. G. KOHL (*Magellan's-Strasse*, Berlin 1877, p. 102). Neither Kohl nor Vaux seems to have known anything of the above-mentioned maps by Hakluyt founded on Drake's observations. Hondius himself did not use his own beautiful map of the world for those editions of Mercator's atlas which he published with the addition of numerous maps.

It is a pleasure to find that those investigations of the west coast of Patagonia and the Magellan Straits which were undertaken by Pedro Sarmiento in 1579—1580 in spite of overwhelming disasters, with so much perseverance, such pious zeal, and noble enthusiasm, are mentioned on the map in HAKLUYT'S *Principal Navigations* of 1599.² This new and relatively correct drawing of the distribution of land at the southern point of America could however not oust the old representation thereof, until Tierra del Fuego had been circumnavigated by a Dutch expedition under the command of William Corneliszoon Schouten and Jacob Le Maire 1615—1617. By their cruising in the waters of Tierra del Fuego four innovations were introduced in cartography, two of which were correct and two incorrect. The Dutch navigators proved that it was possible to sail round Tierra del Fuego, the southern point of which they called "Cape Horn", they discovered a strait, Le Maire's Strait, between the real Tierra del Fuego and an island, Statenland, lying farther to the east. These were the correct innovations; while the incorrect were that Tierra del Fuego, in spite of Drake's observations, was deemed a continuous mass of land, and that Statenland was considered as a projection of the South Polar continent. Thus Le Maire's Strait was regarded as the second passage between the oceans of the world, in commercial importance not inferior to the first.

Schouten and Le Maire's mapping of these countries predominated during the greater part of the 18th century, with some essential amendments introduced after the Spanish expedition of Bartolomeo Garcia de Nodal in 1618, the circumnavigation of Statenland in 1643 by Hendrik Brouwer, the discovery of the Falkland Islands in 1592 by John Davis during Cavendish's circumnavigation of the globe, etc. As a specimen of maps of this kind, fig. 99 shows a chart of these waters from DUDLEY'S *Arcano del Mare*, III, Firenze 1647.

Loaisa's unfortunate expedition was the last attempt to open a south-west route by sea direct from Spain to Australasia. However on June 20th, 1526, the Emperor Charles V sent a letter from Granada to the conqueror of Mexico, Hernando Cortez, with orders to despatch one or two cara-

vels from the west coast of New Spain to the Moluccas, so as to obtain information concerning the fate of the Spaniards who had remained there and that of their vessels. Cortez acted with his usual energy and vigilance. Two large ships and one smaller one, under the command of Alvaro de Saavedra, on October 31st, 1527, left a harbour on the Pacific coast of Mexico in 17° 38' N. lat. When crossing the ocean the commander's vessel lost sight of her two companions (December 15th), which were never heard of again. No islands were met with until Saavedra, on December 29th, arrived at the Ladrões,³ whence he sailed to the Moluccas. In June, 1528, Saavedra set out again for Mexico. He sailed along the east coast of a country which in consequence of the likeness borne by the inhabitants to the natives of Guinea was afterwards called New Guinea, and thence to the north-east; he discovered the Caroline Islands, but in consequence of contrary winds was compelled to return to the Moluccas. A new attempt, made in the summer of 1529, was also a failure owing to constant contrary winds, but led to the discovery of the Marshal Islands. Saavedra died during this attempt to traverse the ocean from west to east. He was a man of great repute and a good commander, treating the natives of the islands on which he landed with a clemency that was most unusual at that period. The slight importance attached by Spain to the discovery of the Carolinas and the Marshal Islands, is proved by HERRERA'S map of the Pacific of 1601 (fig. 93) on which these islands are not even marked.

After this no voyages in the South Sea were undertaken by Spain until in 1542 it was resolved that Spanish colonies should be founded on the Philippines. The first colonists were brought from the west coast of Mexico by Lopez de Villalobos. Some new groups of islands were discovered on the passage, but his attempt to return to Mexico across the ocean was again a failure. It was only after a permanent colony had been established on the Philippine Islands in 1565 by Miguel Lopez de Legaspi, that one of his companions, Fray Andres de Urdaneta, succeeded in finding the route to be followed when sailing back over the Pacific. He sailed in the Asiatic waters towards the north, and on reaching lat. 43° N., steered east-south-east to the American coast. When the course had thus been discovered on which sailing vessels could reckon on favourable winds and currents for their return voyage from Asia, regular communication was opened between the Philippine Islands and Mexico (usually between Manilla and Acapulco). Curiously enough the Sandwich Islands, lying as they do between these north and south ocean routes, remained for centuries undiscovered. Now and again, vessels driven from their course seem to have been in their immediate neighbourhood, as on about the spot now occupied by the Sandwich Islands two islands "La Mesa" and "Los Mojas" are marked on the apparently ancient Spanish chart which Commodore George Anson found on board a Spanish galleon, captured by him in June, 1743, when bound for Manilla. This chart was printed, but unhappily with some "amendments", in *A voyage round the world in the years 1741—1744* by GEORGE ANSON, London 1748, p. 384 (N. figg. 94 and 95).⁴ That such islands, discovered as they were by chance, were never definitely entered on maps or charts was owing to the uncer-

¹ Referring to the reproduction of it on pl. L in the Facsimile-atlas, A. RAINAUD says (p. 272) in his excellent geographical monograph previously cited: "Ainsi la mappemonde qui illustre la grande collection de Hakluyt ne présente pas trace des explorations de l'aventurier anglais." This is exactly the contrary to the facts, as America's southernmost part on this map is drawn according to Drake, as one of the long legends at the lower margin expressly states.

² For Sarmiento's voyages of discovery I must refer the reader to the second volume of JAMES BURNEY'S *Chronological History* previously cited. Sarmiento's journal was first printed in 1768 at Madrid with the title: *Viaje al Estrecho de Magallanes, por el Capitan Pedro Sarmiento de Gamboa*. The anonymous editor here mentions (Introduction, p. IV, foot-note) that at the cloister of San Francisco at Cadiz there exists one of the chief archives of the journals, reports, and original maps of the Spanish navigators. A translation of the narratives of Sarmiento's voyages by C. R. MARKHAM was published, in 1895, in the Works of Hakluyt Society.

³ In a report of his travels, written by the scribe of the armada, Francisco Granado, an island is mentioned which was seen at a distance of 350 leguas (about 1200') from the coast of Mexico, in 11° N. This island may have been simply a cloud on the horizon.

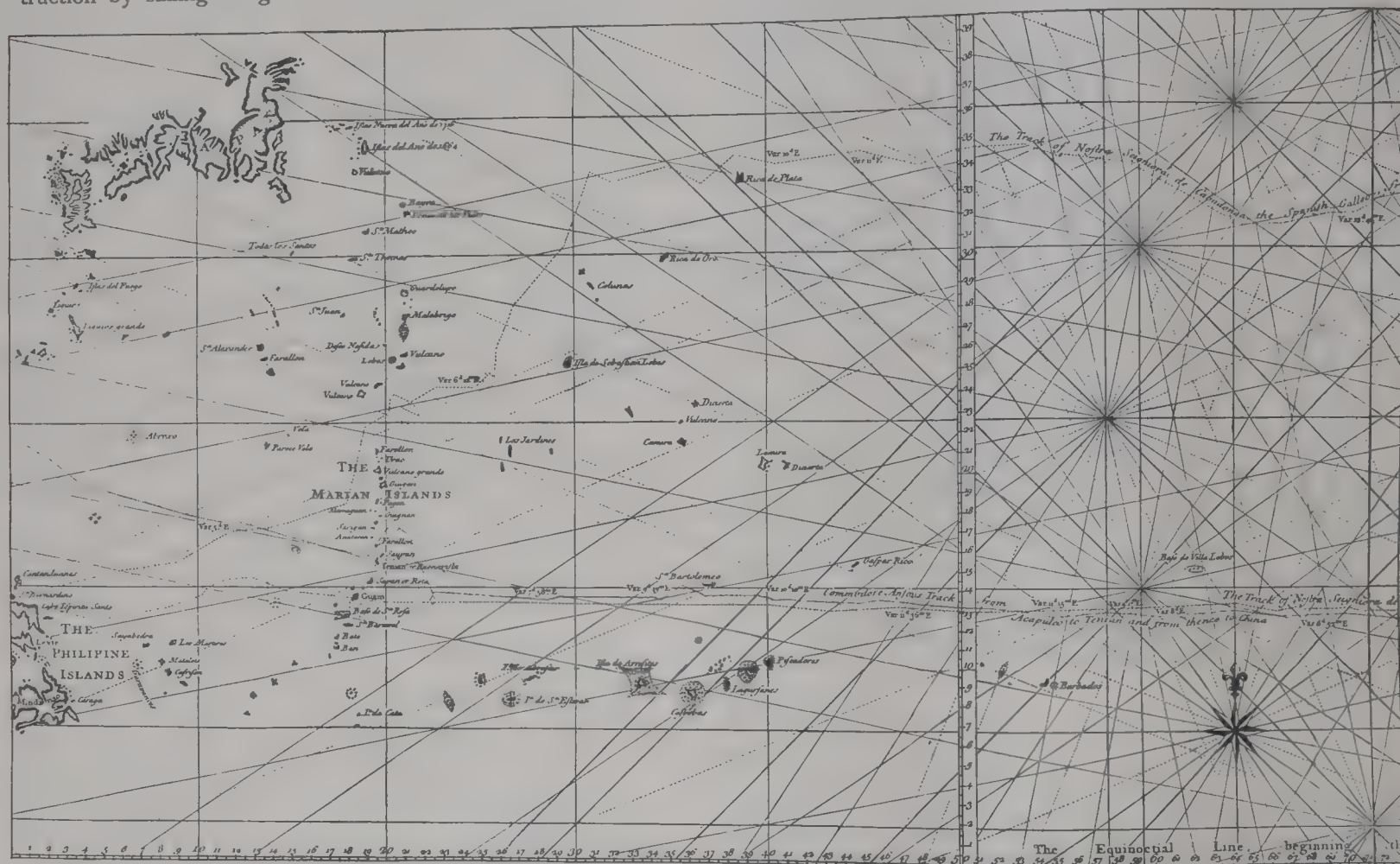
⁴ The question of the identity of La Mesa and Los Mojas with the islands of the Hawaiian archipelago is thoroughly sifted in BURNEY'S *Chronological History*, V, p. 157. Burney has also consulted JOSEPH GONZALEZ CABRERA BUENO: *Navigacion especulativa y pratica*, Manila 1734. Bueno gives a table of the latitude and longitude of those islands discovered by the Spaniards between the Philippines and New Spain.

tainty which there was, even in the eighteenth century, in deciding the geographical coordinates of an island lying out of sight of any known land. It was therefore almost impossible when making the definite maps, or what was called the "Padron general" of the map of the world, to register such isolated observations. After having placed those islands discovered by chance sometimes in one spot sometimes in another, so as to make the last sailing reports agree with the statements of previous mariners, the difficulty was finally solved by simply excluding from the map almost all the newly discovered islands that were far out in the Pacific. The chart of this ocean therefore became almost as blank and devoid of names as the map of the interior of Africa at the commencement of the nineteenth century.

Already during Loaisa's expedition one of the vessels, as has been previously mentioned, having passed through the straits of Magellan was obliged to try to escape destruction by sailing along the west coast of America to Mexico.

Peru. Her mast was raised as a trophy at Lima. The same fate which befell Magellan and Loaisa was also reserved for Camargo. In Peru he became implicated in the intestine feuds, at first joined Gonzalo Pizarro's party, but afterwards took part in an unfortunate conspiracy against the harsh commander Francisco de Carvajal, and was therefore beheaded at his command in 1546. The Spanish colonial territory was further extended to 40° S. lat. by Pedro de Valdivia. He also died a violent death when fighting with the Araucanians. A few years later the Governor of Chile sent two ships under the command of Juan Ladrilleros on a voyage of discovery towards the south; Hernandez and Pedro Gallego¹ accompanied him as navigators. They sailed from Valdivia in November, 1557, and succeeded not only in penetrating to the Magellan Straits, but also in making the passage for the first time from west to east.

Finally the intricate archipelago along the south-west coast of Patagonia was laudably explored and mapped in 1579 and



94. Ancient Spanish chart of the Pacific. Western part. From *A voyage round the world* by GEORGE ANSON, London 1748. (Size of original 0.85 x 0.75 m.)

The limits of the New World to the west were thus fixed pretty much in accordance with the suppositions of the cartographers. The west coast of South America was more closely explored first during the conquering and robbing expeditions of Francisco Pizarro, Diego d'Almagro, Gonzalo Pizarro, and others, which commenced in 1524. In 1526 the Equator was passed; Peru was conquered during the ensuing years. Cuzco was reached in 1532, and in 1535 Ruy Dias by sea and Almagro by land were beyond Coquimbo (29° 52' S.). Thence Gomez d'Alvarado was despatched along the coast as far as 35° S. lat. The coast between here and Magellan's Straits was first explored from the south by an expedition, which in 1539 was sent from Spain by the Bishop of Placencia, Don Gutierre de Vargas, under the command of Alonzo de Camargo. Only one of the three vessels of the expedition managed to traverse the dangerous straits — the third passage since their discovery — and reach the coast of

1580 by the noble-minded Pedro Sarmiento de Gamboa, a man of unusually wide culture in comparison with the discoverers of that time. With him was Hernando Lamero as "piloto mayor." Their mapping afterwards became the standard for these tracts for two centuries, and the names they give of straits and islands on the south-west coast of Patagonia are still in use to a large extent. Sarmiento, having returned to Spain after his fortunate passage through the Magellan Straits, took part in a new expedition sent from Spain in 1581 to colonize and fortify what was then deemed the sole, and therefore in the opinion of statesmen very important, passage by sea from the Atlantic to the Pacific. The colony at the Magellan Straits was of short duration. Sarmiento himself, after suffering shipwreck and many other hardships, first fell into the hands of the English, and afterwards was taken prisoner by the French, and finally in 1590 returned to Spain a broken down old man. Cartography was greatly influenced by

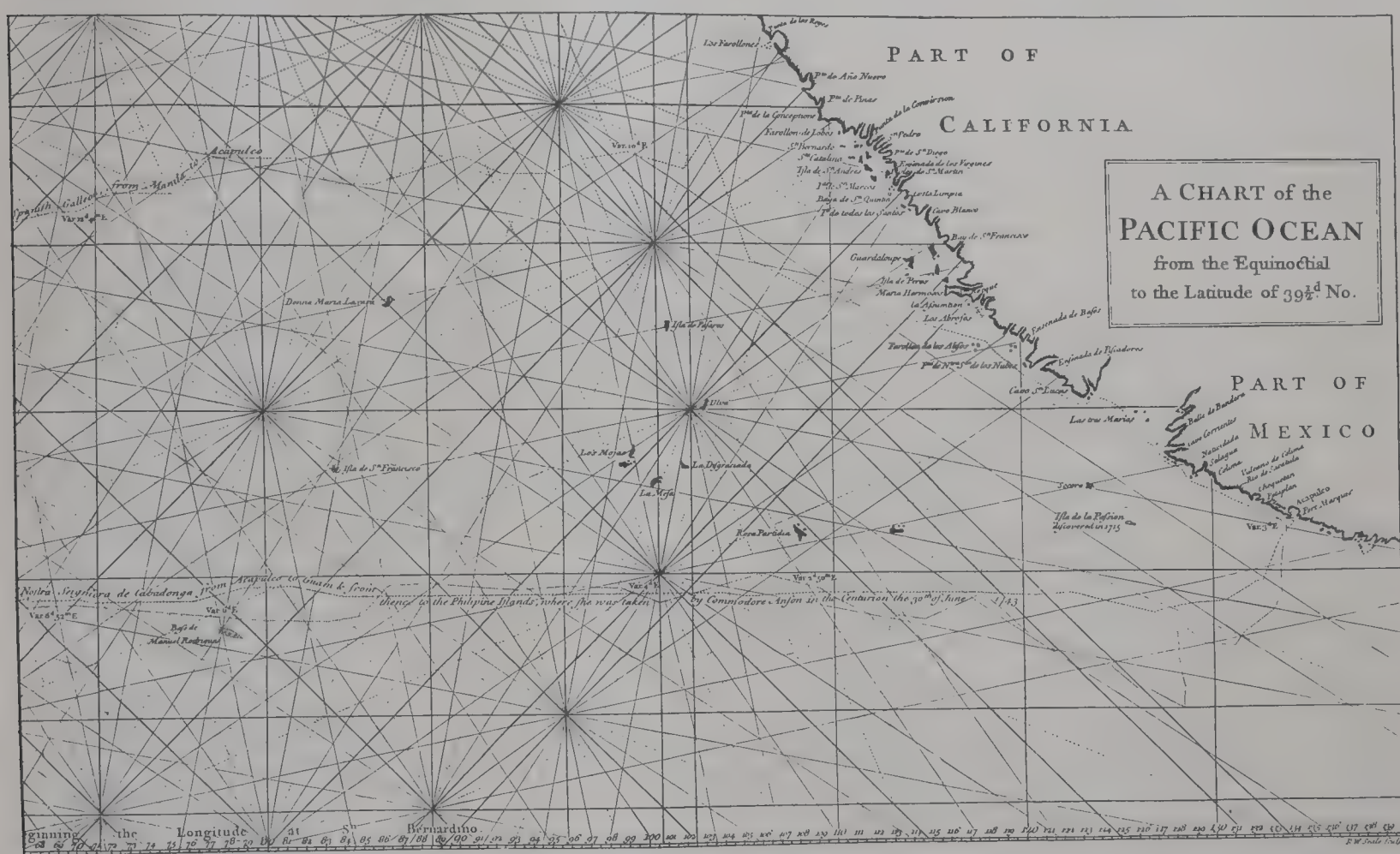
¹ Several navigators by name Gallego are mentioned in the old records of the discoveries in the Pacific. This name here plays the same role as that of Dias in the Portuguese voyages of discovery to the South Atlantic. Perhaps after all Gallego simply signifies a man from Galicia.

his work. His explorations are mentioned already on the map of 1599 in HAKLUYT'S *Principal Navigations* (FA, pl. L).

Not only to the south but also to the west, expeditions were dispatched from the lately conquered Peru to explore the immense ocean bordering the west coast of the New World. Two vessels started for this purpose from Callao, the port of Lima, on January 10th, 1567, under the command of Alvaro de Mendana. Hernan Gallego accompanied him as navigator. Mendana succeeded in coming across an ocean, closely interspersed with islands, without perceiving any land until he had sailed 1 480 leagues (about 5 000'), when in 6° 45' S. lat. he discovered a small inhabited island which they called Isla de Jesus. One hundred and sixty leagues farther on he saw some other low islands, Baxos de la Candelaria. Not far from these they came across a large archipelago (the Solomon Islands) inhabited by savages, friendly in some parts, while in others they were hostile. The archipelago

tives or by disease. After Mendana's death, Donna Ysabel was appointed commander (amiranta) of the expedition. Her vessel reached the Philippines after many hardships and misfortunes; another of the vessels of the expedition did so too, but with no living soul on board. The rest of the vessels were shipwrecked. During this expedition the Marquesas Islands (Los Marquesas de Mendoza), the San Bernardo Islands, La Solitaria, and the Santa Cruz Islands were discovered, as also an island north of the Equator.

Mendana had two remarkable men with him as lieutenants and navigators, on the first voyage Hernan or Fernandez Gallego, on the second Pedro Fernandez de Quiros. The former must have made at least one more voyage to the islands of the Pacific, although it is not entered among the voyages of discovery of the sixteenth century. This is shown by the following inscription which occurs near a long series of islands in the Pacific on the map reproduced by me on pl. LVII from JOANNES JANSONIUS' large atlas, V, first edition,



95. Ancient Spanish chart of the Pacific. Eastern part. From *A voyage round the world* by GEORGE ANSON, London 1748. (Size of original 0.85 x 0.75 m.)

having been explored, the expedition returned. The course was at first steered northwards to 30° N., and then across the ocean to Mexico. During this passage the two vessels became separated, but met again at the close of January, 1568, at St. Jago on the Mexican coast. On their return voyage, a couple of islands were seen north of the equator; the one, which was said to be in about 19° 20' N. lat. and was called San Francisco, may possibly have been one of the Sandwich Islands.

In 1595, 28 years after his first voyage, Mendana again sailed from Paita on the Peruvian coast with four vessels, manned by 378 persons, with the intention of founding a colony on the Solomon Islands. His wife Donna Ysabel Berreto accompanied them. Pedro Fernandez de Quiros was "piloto mayor". The voyage was a complete failure. The Solomon Islands could not be discovered, and instead an attempt was made to found a colony on the islands of Santa Cruz. The project had however to be abandoned, as Mendana himself and many of the crew perished either in fight with the na-

1650: "Insulas esse a nova Guinea usque ad Fretum Magelanicum, affirmat Hernandus Galego, qui ad eas explorandas missus fuit a Rege Hispaniae Anno 1576." Very possibly Hernan Gallego had traversed the Pacific on a more southerly parallel than Mendana and during the passage discovered not merely one or two isolated isles or groups of islands but whole the island world of the Pacific. Quiros, on the other hand, became the commander of an expedition, which with two large vessels and a sloop started to explore the South Sea, leaving Callao on December 21st, 1605. Luis Vaz de Torres, "the cleverest mariner of Spain", accompanied him as second in command. Perhaps their object was to prove Gallego's discoveries. The voyage was full of results, both by the discovery of the Paumotu archipelago, the New Hebrides, and several other important groups of islands, and also by Torres' sailing in through the strait which separates New Guinea from Australia and is so dangerous in consequence of its innumerable isles and shallows. Some mountain tops on the north coast of Australia were also seen from Torres' vessels. Torres' account

of the voyage was, however, forgotten in the archives of Manila until this town was taken by the English in 1762. Quiros, on his return, vainly besieged the Spanish court with enthusiastic petitions to colonize the great Australian continent which he considered he had discovered. These accounts were incorporated in the geographical literature of the seventeenth century and prepared the public mind for the great discoveries made by Cook in the South Sea during the latter part of the eighteenth century.

Most of the oldest maps of the world which embrace the New World (*vide supra* Cart. Am. Nos 33, 81, 99, 140, etc.) represent the isthmus of Panama as divided by a narrow strait separating the American continent into a northern and southern half. Probably this representation was due to an imperfect comprehension of the statements of the natives about the hydrographic conditions of Panama, *e. g.* an account of Lake Nicaragua (which the natives probably considered as large as an ocean) and its connection with the Western Sea. The tales were believed, and many expeditions were despatched from the West Indies to Terra Firma to discover the important strait. The first maritime expedition which Cortez sent from the west coast of Mexico was equipped solely with the intention of discovering this strait. However, having ascertained that no such passage existed at the supposed point, he at the express command of Charles V, despatched the expedition previously mentioned from the west coast of Mexico to the Moluccas, which finally led to a regular communication across the Pacific.¹

After this Cortez equipped many naval expeditions for the exploration of the coast to the north-west. The most important geographical problem of that time could only be solved in this direction. The question to be decided was whether the New World was connected with Asia or was an independent continent. The Spanish expeditions, sent out to settle this question met however with constant reverses. On the first, which left Acapulco in 1532, the flagship came but little farther than 25° N. lat., where the captain, Diego Hurtado de Mendoza, and his crew were killed by the natives. The same fate befell the crew of a second vessel at another spot on the coast, only two men escaping with their lives. When these misfortunes were related to Cortez, he at once began to build and equip two new vessels. They sailed from St. Jago (16° 30' N.) on October 30th, 1533, but were separated by a storm on the following day. The one returned after an almost fruitless cruise in the Pacific. Mutiny broke out on the other vessel, Captain Diego Berrera de Mendoza was killed, and the mate Fortun Ximenes was chosen as commander. He discovered the south point of the peninsula of California, but in his turn he was killed by the natives together with most of the crew. Only two of the men managed to make their escape to Mexico.

In 1535 Cortez himself put to sea with three vessels for the north-west. He too reached the southernmost point of the Californian peninsula but the attempt to found a colony there at a place called Santa Cruz was a failure. It is from this expedition we get the map entered under No. 111 (p. 181).

Far richer in results were the expeditions of Francisco de Ulloa in 1539 and Hernando de Alarcon in 1540. Ulloa on the west coast came as far as Cape Engaño, while Alarcon

sailed to the innermost part of the Californian Gulf and then by boat up the large river Colorado which there flows into the gulf. The gulf itself and the peninsula were explored in a most praiseworthy manner, and a map made which, for a lengthy period, was the standard for the cartography of this tract. This map, copied from an original which belonged to Cortez, has been published in FRANCISCO ANTONIO LORENZANA'S *Historia de Nueva España*, Mexico 1770, and is reproduced from this drawing in fig. 89. On comparing this map with the chart of JANSSONIUS of 1650 (N. pl. LVII) we find that during the interval an innovation had been introduced in the cartography of this tract, as the Californian peninsula on the map last-mentioned is not drawn as a peninsula but as a large island, entirely surrounded by sea. A small vignette map of the New Hemisphere, with California mapped as an island, occurs already on the second copper-engraved Latin title-page to the French and Dutch editions of ANTONIO HERRERA'S *Historia general*, Amsterdam 1622.² The large map on pl. I of these editions has, however, pretty closely followed the maps in the Spanish edition, Madrid 1601 (N. fig. 93). This incorrect type of Californian mapping is most fully developed in a map in the third volume of PURCHAS'S *Pilgrimes*, London 1625, and is here reproduced on pl. LX. The map is inserted in Chap. XX of the aforesaid work, which bears the rubric: "A brief Discourse of the probabilities of a passage to the Westerne or South Sea, illustrated with testimonies and a briefe Treatise and Mappe by Master Briggs." The same chapter also contains Juan de Fuca's remarkable communication to Michael Loch (*cf.* p. 194). As stated at the beginning of the chapter, the map is made by the distinguished mathematician Henry Briggs (died 1630) who, previous to producing his logarithmic system, had written several important essays on navigation and assisted Edward Wright in calculating the degrees for charts on Mercator's projection. Purchas calls him *that thrice learned and... three times thrice industrious mathematician Master Briggs, famous for his readings in both universities and this honourable citie*. Baffin is spoken of as *that learned-unlearned mariner*.

The Californian Gulf (or strait) was at first called Mar Vermejo, and on the hand-drawn maps of the sixteenth century was generally coloured in the same style as the Red Sea on the portolanos of the fourteenth and fifteenth centuries, plainly with the idea that this gulf formed the limit of Asia in the direction of the New World, in the same way as the Red Sea formed a boundary between Asia and Africa. For further exploration of the coast and for the investigation of this important question, a new expedition was in 1542 despatched by the vice-roy of Mexico. The commander of this expedition was Juan Rodriguez Cabrillo. After wintering at a place called Puerta de Pinos, which, according to Wytfliet, was in 40° N. lat., he reached a cape, which was called Cape Mendocino, and still farther north came to Cape Fortune, lying (according to Wytfliet: FA, pl. LI) in 45° N. lat., and thus considerably north of the present San Francisco. The determination of latitude seems, however, to have been very unreliable. Simultaneously with Cabrillo's maritime expedition, a remarkable exploration by land was undertaken along the coast under the command of Francisco Vasques de Coronado. For a brief account of the explorations made by Coro-

¹ BURNEY (Vol. I, p. 163) and NAVARRETE (Vol. IV, p. x) give accounts of the explorations and investigations undertaken by the Spaniards to facilitate communication by land across the isthmus of Panama. Alvaro de Saavedra who died in 1529 during his second unsuccessful attempt to sail back to Mexico across the Pacific (see p. 189) is said to have intended, on his return, to devote the rest of his life to the making of a canal across the isthmus of Panama (BURNEY, I, p. 157).

² Santa Cruz's map of 1542 (N. pl. L) represents the south part of the Californian peninsula as an island with the inscription *y a que descubrio el mar-gues del Valle*, and farther to the north *tierra que embio a descubrir don Antonio de Mendoza*. The circular form given by Santa Cruz to the Californian Gulf proves that the mapper had no knowledge of Alarcon's exploring expedition. — Concerning the origin of the name California *vide* WINSOR, *op. cit.* II, p. 443. It occurs for the first time in an account of the voyage of exploration undertaken by Francisco Ulloa, printed in RAMUSIO, Vol. III. The first maps on which I have observed it, are MERCATOR'S map of the world of 1569 and ORTELIUS' *Americae nova descriptio* of 1570. I cannot remember having seen the name on any map drawn by hand of a more ancient date. It occurs, however, in that copy which LORENZANA printed in 1770 of Domingo del Castillo's map of 1541 (N. fig. 89).

After Cabrilho's return all attempts on the part of Spain to explore the north-west coast of America were abandoned for a lengthy period. This country, perhaps the most fertile in the world as well as the richest in metals, was deemed to be "worthless, unsuited for cultivation and without any of the precious metals". This opinion was expressed by a circumnavigator at the commencement of the present century. The belief in a north-west passage from the Atlantic to the Pacific seems also to have been shaken. It was therefore left to Bering's and other expeditions equipped by Russia during the first half of the eighteenth century, and to James Cook's voyages of discovery in the Pacific, to furnish a fairly correct idea of the limits of the New World to the north-west.

Among these may be reckoned Drake's circumnavigation of the world (1577—80). After having traversed the straits of Magellan and plundered and destroyed many Spanish settlements on the coast of the Pacific, he sailed, probably with the intention of discovering the north-west passage, first up to 48° N. lat. and thence towards the south along the coast which was called New Albion, as far as 37° N., of course without discovering the strait so eagerly sought for.

Other buccaneer expeditions tried their luck by this same route, and probably some of them penetrated, certainly not to Bering's straits but perhaps as far as to the Vancouver archipelago, where the large islands along the coast were confounded with the continent of Asia, in the same way as Company Land (Urup) on the Asiatic side was confounded with the American mainland by the Dutch explorers, to the no small trouble of cartographers. It was now believed that the



As is often the case these important discoveries were preceded by a period during which at times many wonderful guesses, as to the geography of that part of the world, were made.

During the sixteenth century and even later the possibility of a north-west passage was fully believed in, not only in the signification the phrase has received in our day, but also in the existence of a strait or open sea, free from ice, lying north of the American continent, which passage was supposed to offer an easy and short route from Europe to the commercial treasures of China and India. The belief in this commercial route was the cause not only of many marine expeditions which tried to reach the strait from the Atlantic, but also of similar expeditions along the Pacific coast of America.

great problem was solved. The news which could not be kept a perfect secret, gave rise to the introduction of the straits of Anian in maps of the latter part of the 16th century, to the Maldonado deception and the Fuca myth. The first *dated* map, on which the Anian straits is found, is one by BOLOGNINUS ZALTERIUS, engraved in Venice in 1566 (FA, fig. 81). The unusual name here given to North America, "Nova Franza", renders it probable that it was executed to the order of the same celebrated French geographer, Nicolas Nicolay, for whom some years previously Forlani of Venice had executed a map of the Atlantic (N. pl. XXVII). It is possible that the mapping of the narrow strait between the Old and the New Continents was founded on accounts given by the natives to the European free-booters or hunters who

* A possibly older but anonymous and undated map, with the name "Streto di Anian", is beautifully reproduced in pl. 30 of KRETSCHMER's atlas from an original in the Correr Collection in Museo civico in Venice. On this map several names in the neighbourhood of the strait are taken from Marco Polo (compare S. RUGE, *Abhandl. und Vorträge zur Geschichte der Erdkunde*, Dresden 1888, pp. 53—70 and KRETSCHMER, *op. cit. supra*, p. 440).

ventured among the Indian tribes of the northern part of North America. Similar accounts among the savages in the tracts north and west of Virginia are mentioned, for instance in PURCHAS, III, p. 849. The strait is mapped as a long, large inlet in CORNELIUS DE JUDAEIS' map of the world (FA, pl. XLVIII) and in much the same manner under the name of "Stretto de Jezo", in DUDLEY's *Arcano del Mare*. Fig. 96 shows the notion entertained in 1652 by the celebrated French geographer NICOLAS SANSON D'ABBEVILLE concerning the geography of these regions. He had as yet no knowledge of the Dutch exploring expeditions sent out by Van Diemen to these parts. On QUAD's map of the world entered in *Eurypae . . . descriptio*, Coloniae 1594, and in *Fasciculus Geographicus* 1608 (FA, pl. XLIX) the strait is called "El streto de Amar" (Amur), whereas the name "Anian regnum" is retained for the land east of the strait. So far as I know this name occurs for the first time as the designation of a province (Ania Pro.) on Gastaldi's large map of Asia of the year 1561 (Terza parte dell'Asia, N. T. LVI). It is accompanied by a number of legends borrowed from the tales of the Venetians who went to central Asia.

Maldonado's mapping of the Anian Straits, as also a translation of the account of his voyage, are reproduced by CARLO AMORETTI (*Viaggio del Mare Atlantico al Pacifico per la via del Nord-Ovest etc. fatto dal Capitano Lorenzo Ferrer Maldonado l'anno MDLXXXVIII*, Milano 1811). The same work was published in a French translation, "Plaisance" 1812. An English translation of the text, as well as the reproduction of the accompanying drawings, was given by JOHN BARROW (*A chronological history of voyages into the Arctic regions*, London 1818). Probably Maldonado copied on an increased scale the same original which was used for Zalterius' map. The whole of the account given by the far-famed adventurer is in other respects an obvious fiction. This however cannot be the case with the voyages along the north-western coast of America, which were undertaken by a Greek, Juan de Fuca, or, as his real name is, Apostolos Valerianos. During his homeward voyage from his forty-years' sojourn as a seaman in the Spanish Indies, Fuca passed through Venice in 1596 and there met the experienced English merchant Michael Loch. To him among others he related a voyage which he had undertaken on behalf of the viceroy of Mexico in 1592, during which he had discovered the much sought-for strait, which was supposed to lead from the north part of the Pacific to the North Polar Sea. He said that it was completely free from ice and therefore a very convenient route from England to the Moluccas. The account gave rise to various writings, and was finally printed in PURCHAS' *His Pilgrimes*, III, London 1625, chapter XX, p. 849. Fuca had obviously reached the strait which still bears his name south of Vancouver's Island, and mistaken it for the passage between the two oceans of the world. Fuca's account afterwards caused many expeditions to be sent along the north-west coast of America. So late as 1792 a Spanish expedition was despatched to explore the Fuca Straits;² but it was not till Vancouver's expedition 1791-95 that the archipelago in question was mapped and the discovery of Fuca reduced to its proper dimensions.

The mouth of the River Anadyr, which is on the Asiatic shores of the Pacific, south of the Anian Straits, was first reached from the Siberian side by Russian hunters under the command of Deschnev in 1648; but this important discovery remained for a long time unknown in Moscow. Afterwards Kamtchatka is spoken of for the first time in a book printed in Hamburg in 1698, being an account of Evert Ysbrandsz. Ide's embassy to China 1692-95. The true discoverer of Kamtchatka is considered to be the governor of Anadyrsk, Volodomir Atlassov, who, in 1697, penetrated to

the Kamtchatka River and there raised a pillar as a memorial of his discovery. In 1700 he went to Moscow to give the government an account of his discovery. He then had with him a Japanese who had been storm-driven and wrecked on the coast of Kamtchatka. After his return this intrepid freebooter was in 1711 murdered by his own countrymen in Anadyrsk. The murderers tried to expiate their crime and farther to come out of the reach of justice by the conquest of South Kamtchatka. They came to the islands of the Kuriles lying farthest north, concerning which information had previously been obtained from another Japanese crew, who in 1710 were wrecked on the coast of Kamtchatka. The Kuriles were fully mapped a few years later by Ivan Kosirevskoi. In the year 1729 a Japanese vessel loaded with rice, was again stranded on the coast of Kamtchatka (*The voyage of the Vega*, II, p. 181). I remind the reader here of these involuntary voyages from the littoral of south eastern Asia to the north part of the Pacific, because they are not only of importance for ethnography as showing the possibility of Asiatic influence on the pre-Columbian culture of America; but also directly reminded the Siberian conquerors of the many questions still unsolved concerning the hydrography of north eastern Asia.

Navigation on the Ochotsk Sea was opened up by Swedish prisoners of war during the days of the great northern struggles. Some of these were sent by Peter I to Ochotsk with orders "to build a vessel, and provided with a compass to sail with some Cossacks over to Kamtchatka and back again". The voyage (1716-17) was a successful one, although many difficulties were encountered. This was the first expedition across the Ochotsk Sea. It was under the command of the Cossack Sokolov. Among the Swedish members Henry Busch and Ambjörn Molin are mentioned (*cf. Voyage of the Vega*, Vol. II, p. 175).

It was partly in consequence of information received from the members of these expeditions that another Swedish prisoner of war, Strahlenberg, made his large map of Siberia, which was ready in 1721, though not printed until 1730; this map is reproduced here on a reduced scale in pl. XXXVIII (*cf. p. 98*). This is, so far as I can discover, the first map on which the peninsula of Kamtchatka and the Ochotsk Sea are laid down. Even in 1705 Witsen, in the second edition of his great work, reproduces, without any objections being raised, Johannes Blaeu's map of the north-east of Asia, on which map there is no curve for the Ochotsk Sea. The representation of that part of the globe is as imperfect on the map of about 1710 drawn according to Witsen, here reproduced on pl. LIX, and also on the map (*Voyage of the Vega*, Vol. II, p. 177) published by the Russian Academy of Sciences in their atlas issued in 1737.

Slow was the progress made as regards the development of our knowledge of the outlines of the large Japanese islands, as also concerning the adjacent littoral of Eastern Asia. Zipangu ever since Behaim's time had certainly been represented as a large island in the Pacific, usually off the east coast of Asia, but sometimes also farther out eastwards in the neighbourhood of America; but no hint concerning any real knowledge of the limits of this island or group of islands is to be traced in the maps of 16th century. In *Tabulae modernae* in PTOLEMY 1548 and 1561 (FA, pl. XLV) Japan is scarcely distinctly marked. In GASTALDI's map of 1562 (N. fig. 77) "Cinpaga" forms an island, half the size of Iceland, placed in the midst of a bay of the sea (Coleo! de Tonza) between north eastern Asia and north western America; in DE JUDAEIS' map of 1593 (FA, pl. XLVIII) "Iapan" forms a large island, which in the south shuts off the immense "Stretto de Anian", placed in about the proper longitude; and in map 47, "Tartariae sive Magni Chami regni typus", in the edition of OR-

² *Relacion del viage hecho por las goletas Sutil y Mexicana en el año de 1792, para reconocer el estrecho de Fuca*, Madrid 1802. The work begins with a chronological enumeration of the Spanish voyages of discovery along the north-west coast of America.

TELIUS' *Theatrum* for 1570, Japan is placed in the manner which was afterwards retained a good way on in the seventeenth century. The first special map of this group of islands (N. fig. 97) is in *Navigatio ac Itinerarium Iohannis Hugonis Linscotani in orientalem sive Lusitanorum Indiam*, Hagae Comitit 1599. It is obviously founded on information collected by Linschoten, during his sojourn in Goa 1583—1589 when he served the then Archbishop Vincentius Fonseca. Linschoten's map was afterwards the prevailing type for the mapping of Japan for a long succession of years. Corea is also entered thereon with an inscription, declaring that no satisfactory conclusion had been arrived at as to whether it was an island or a peninsula. The statement that this country was first marked in the Jesuit Martini's *Atlas Sinensis*, which was printed in 1649, is therefore incorrect. As early as 1565 Louis Fréjus, the

given them were partly founded on the ideas prevalent concerning the geography of eastern Asia in 16th century. Both vessels sailed in company along the coast of Nippon to 40° N. lat. Here they were separated by a storm. The Kastrikom under the command of De Vries, reached the north-eastern promontories of Jesso and the two important Kurile islands Iturup and Urup, which were called Staten Eiland and Compagnies Land. The latter island, along the west coast of which De Vries sailed some way, he took to be a part of the north-west coast of America. This mistake, as also the interchanging of Sachalin with Jesso, caused great confusion in the cartography of these parts, which the learned geographers of the 17th and first part of the 18th centuries vainly tried to clear up, and which was not fully unravelled until the discoveries by the Russians in Siberia and their voyages along



97. Japan. From *Navigatio ac Itinerarium IOANNIS HUGONIS LINSCHOTANI*, Hagae Comitit 1599. (Size of original. 0.43 x 0.34 m.)

Jesuit, in a letter from the Japanese town of Miako, speaks of a large island, which lies north of Nippon, is called Jesso, and is inhabited by a bearded race (ARNOLD MONTANUS: *Denkwürdige Gesandtschaften . . an unterschiedliche Keiser von Japan*, Amsterdam 1669, p. 54); expeditions for the further exploration thereof were sent out even from Japan.

Little however was known of the geography of these countries until the Dutch Governor General of India, Antonio van Diemen, caused an expedition to be equipped, which on February 3rd, 1643, left Batavia with orders to clear up the chief points in the geography of north-east Asia. The expedition consisted of two vessels, called the *Kastrikom* and the *Breskens*, under command of Martin de Vries and Hendrik Corneliszoon Schaep. The particular instructions

those coasts, as also by the expeditions of James Cook, La Perouse, George Vancouver, and others.

The great archipelago south of Japan was, as I have previously stated, discovered and by degrees mapped by the Portuguese from the East and the Spaniards from the West; by the former after the conquest of Malacca in 1511, by the latter after Magellan and Loaisa had sailed across the Pacific (1521 and 1526), and above all after the first colonists were established at the Philippines and after Fray Urdaneta had discovered the return route across the north part of the Pacific to New Spain and thereby made possible a regular communication by sea between the Spanish possessions on either side of the great ocean. With the material at present available it would be very difficult to give a detailed account of

the discovery of the various islands by Europeans, and impossible to bring such an account within the limits of this work. For this chapter in the history of geography and cartography, I must refer the reader to the many maps reproduced here, as also to the comprehensive, though as yet certainly anything but exhaustive, literature.

During their voyages among the Moluccas the Portuguese were doubtless often driven by storms far to the east. Thus in 1526, during a voyage from Malacca to the Moluccas, Jorge de Menezes, who followed the route north of Borneo, was driven by unfavourable winds and ignorance of the fair-way, to the islands in Geelvink bay on the north coast of "Papua" or New Guinea. The inscription on LINSCHOTEN-LANGREN's map reproduced here on pl. LX, *Hic hibernavit Georgius a Menezes*, reminds us of this event. Menezes thus became the European discoverer of this large island. Somewhat farther south on the same map there is another similar involuntary discovery of islands, perhaps off the coast of Australia itself, noted with the words: "A qui in vernon Martin Alfonso de Melo." It is however possible that Antonio d'Abreu, some years before, during his voyage of discovery to the Moluccas, had seen the coast of New Guinea. After Menezes, during his attempt to return to Mexico across the Pacific, Alvaro de Saavedra sailed (1528 and 1529) along the north coast of New Guinea, which was called *Isla de Oro*. In 1537 part of the crew of Grijalva's Pacific expedition, despatched from Peru, passed some time at this island. Grijalva having been murdered by his own sailors, the ship stranded at New Guinea and the crew were made prisoners by the natives. They were liberated by the Portuguese governor of the Moluccas, Antonio Galvão, celebrated for his work on old and new voyages of discovery, first printed in Lisbon 1555(?) and 1563, and afterwards (1862) reprinted in the Publications of the Hakluyt Society. When in 1545 Ynigo Ortiz de Rota (Retes) again made an unsuccessful attempt to return to Mexico from the Philippines, across the Pacific on the route south of the equator, he sailed along the coast of the island and, in consequence of the black colour and woolly hair of the natives, named the country Nova Guinea. Menezes had previously called it Os Papuas, and Saavedra *Isla de Oro*. For more particular information about the history of the discovery of Guinea and for references I must refer the reader to: *Progress of discovery on the coasts of New-Guinea* by C. R. MARKHAM, with bibliographical appendix by E. C. RYE. *Royal Geogr. Society, Supplementary Papers*, I, London 1884, p. 265.

Probably the Portuguese also reached the large island or continent lying farther south which forms the main part of the fifth division of the world, the "Terra Australis", to which geographers since the beginning of 16th century had been inclined to allot a large space on the surface of the globe. The real history of its discovery, at all events from a cartographical point of view, is difficult to clear up, as certain parts of the imaginary land, Terra Australis, on a number of printed maps from the sixteenth century, agree as regards position so closely with the large island afterwards called New Holland, that with respect to the mapping it is difficult to decide what was really observed or discovered and how much depended solely on theoretical speculations.

As maps of this kind, *i. e.* theoretical maps, from which no information concerning the history of geographical discoveries is obtainable, we must class all maps of the Austra-

lian continent from Franciscus Monachus (N. fig. 41) to Quad (FA, pl. XLIX); also the map in ARIAS MONTANUS' *Biblia Polyglotta*, VIII, Antverpiae 1572,² as well as those maps on which a large island south of the Moluccas is drawn under the name of "Java la grande" and provided with numerous legends and pictures of the animals and plants supposed to belong to the country. Such a map signed *Pierre de Desceliers 1546* (Mappemonde de Henri II), is reproduced here on pl. LI-LIII. In this same group of maps, according to R. H. MAJOR (*Early Voyages to Terra Australis*, London 1859, Introduction) we must class a map of the world of 1542, that formerly belonged to the Earl of Oxford, two maps in John Rotz' Boke of Idrography, Nicolas Vallard's atlas of 1547, and a portolano by Guillaume le Testu of 1555. (They are cited above in Cart. Asiana under numbers 88, 89, 93, 96, 109.) As regards the real history of the discovery of New Holland or Australia these maps are of scarcely any other import than that they are a proof of a tradition existing on the Moluccas and among the Portuguese travellers to India that there was a large fertile and populous country farther towards the south.

There is no certain proof that the Portuguese during their voyages among the islands of south-eastern Asia ever reached Australia. It is true that R. H. MAJOR³ found in the British Museum a hand-drawn map of the world which seemed to be a copy of a map of about 1620, and on which an inscription on a stretch of coast, possibly corresponding to north-western Australia, stated that the country had been discovered by Manuel Godinho de Eredia by command of the viceroy Ayres de Saldanha. But by a later find in the archives Dr. E. T. HAMY⁴ has been able to furnish us pretty complete data concerning that in many respects interesting personage, the Spanish mestiz Godinho de Eredia and his fate. From these, it is evident that the history of the discovery in question is owing to mistake.

It is generally believed that the continent of Australia was first seen during the aforementioned Spanish expedition of Pedro Fernandez Quiros, which on Dec. 21st, 1605, sailed from Callao. The aim of the expedition was to found a colony on the island of Santa Cruz discovered during the voyage undertaken by Mendana in which Quiros was piloto mayor, and from Santa Cruz to explore the Southern Continent, the existence of which no cosmographer questioned. *Terras hic esse certum est, sed quantas quibusque limitibus finitas incertum*, says Mercator as early as 1538. No colony was established, and Quiros himself did not reach the Australian mainland. He, however, discovered many important islands and groups of islands in the Pacific. His second in command, Torres, after being separated from the flagship by storms and mistakes, sailed through the dangerous strait between New Guinea and Australia (Torres Straits), and even saw some mountain peaks on the long-sought-for mainland itself. For fuller details concerning this remarkable voyage and for references to older works I must refer the reader to ALEXANDRE DALRYMPLE: *An historical Collection of the several Voyages and Discoveries in the South Pacific Ocean*, London 1770-71, to the afore-mentioned works by BURNEY and MAJOR, as also to JUSTO ZARAGOZA's *Historia del descubrimiento de las regiones Australes*, Madrid 1876-80.

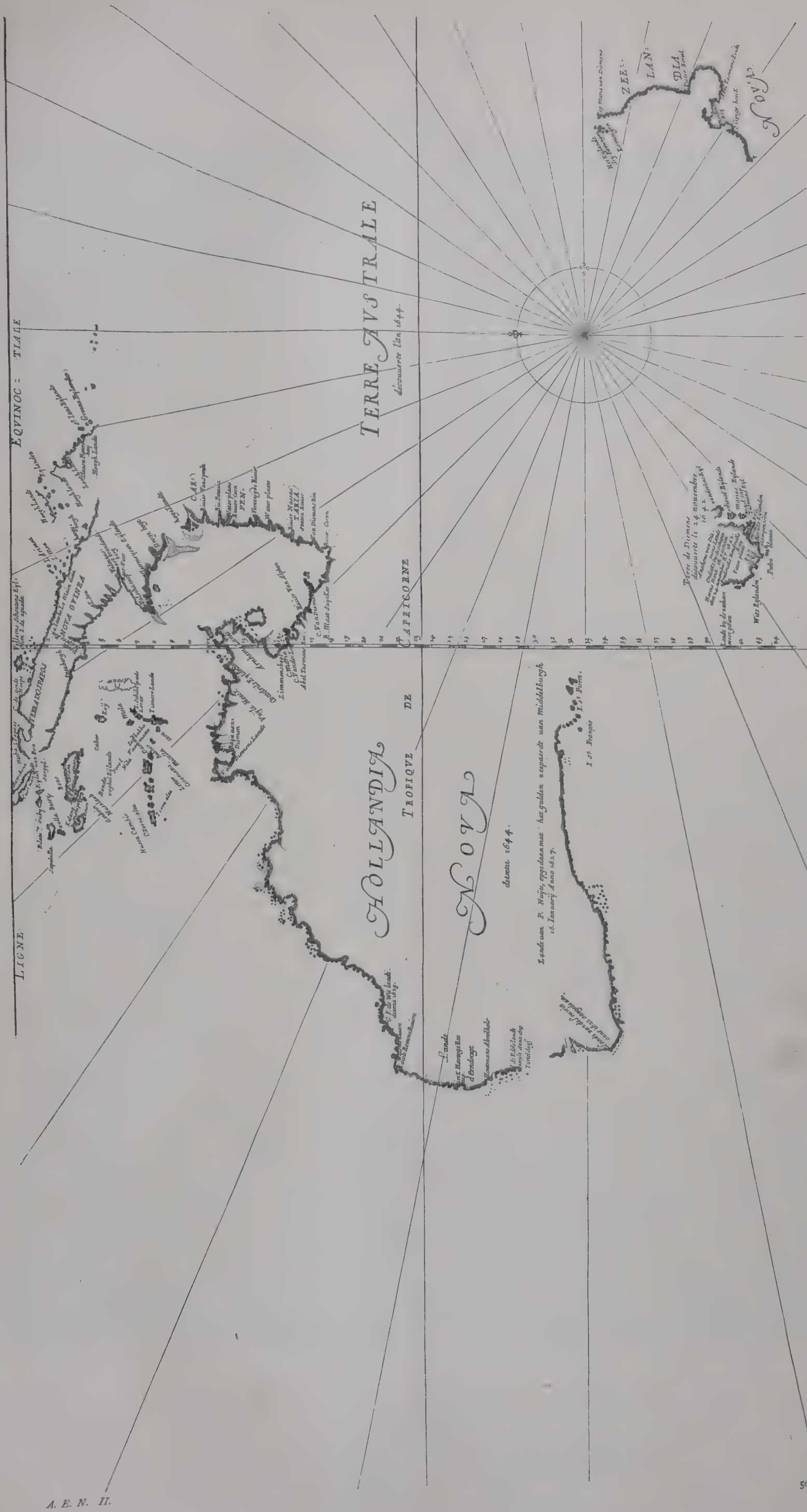
Quiros discovered several of the islands east of Australia, among them the New Hebrides and the Society Islands; but the mainland which, as previously stated, had long

² Previously (FA, fig. 61) I have reproduced a map of the islands of Australasia, which was bound in a copy of LINSCHOTEN's *Navigatio ac Itinerarium* etc., Hagae Comitum 1599, in my possession. This map, signed "Henricus Hondius, Amstelodami apud Ioannem Ianssonium", is important as regards both mapping and projection. However, as Mr. George Collingridge has remarked, the inscription *Terra dos Papous a Jacobo le Maire dicta Nova Guinea*, same map was used later on for completing an older edition. It is not identical with the corresponding map in MERCATOR-HONDIUS' atlas of 1630, nor with JANSSONIUS' *Mar di India* of 1657, mapped on Mercator's projection also.

³ This, as well as many other maps that are of importance for the history of the discovery of Australia, is reproduced in *Remarkable Maps*, II-III: *The Geography of Australia*, edited by C. H. COOTE, Amsterdam, Fr. Muller & Co 1895.

⁴ R. H. MAJOR: *On the discovery of Australia by the Portuguese in 1601* (*Early voyages to Terra Australis*, London 1859, supplement 1861).

Dr. E. T. HAMY: *Le Descobridor Godinho de Eredia* (*Etudes historiques et géographiques*, Paris 1896, p. 281).



98. Australia. From (THEVENOT), *Relations de divers voyages curieux*, Paris 1666. (Original size 0,69 X 0,375 m.)

been placed on the maps, he never reached, though he himself was so fully convinced of it, that he repeatedly urged Philip II to take possession of this fifth part of the world (Australia del Espíritu santo). One of the memorials to Philip II, printed in PURCHAS, Vol. IV, p. 1427, from a publication in Seville of 1610, not accessible to me, begins: "I have informed Your Majesty that to the south there is a fourth of the globe unexplored, and that I there discovered 23 islands the names of which are: La Encarnacion, San Juan Bautista, Santelmo, Las quatro Coronadas, San Miguel Archangel, La conversion de San Paulo, La Dezena, La Sagitaria, La Fugitiva, La [isla] del Peregrino, Nuestra Sennora del Socorro, Monterrey, Tucopia, San Marcos, El Vergel, Las Lacrimas de San Pedro, Los Portales de Belen, El Pilar de Zaragoza, San Raymundo, La isla de la Virgen Maria, and close to these the three parts of the country called "Australia del Espíritu santo".¹ Towards the close of this appeal, which Purchas cites in Spanish, you read: "Acquire, Sire, since it is in your power, with a little money, which will be needed but once, acquire Heaven, eternal fame, and that New World, with all its treasures" (DALRYMPLE, Vol. I, p. 173.) The appeal was, however, in vain. Almost 200 years were to pass before the hopes and prophecies of the dreamer should be fulfilled. But even before Quiros' death (in 1614 at Panama while preparing a new expedition to the southern Pacific at his own expense) a new series of voyages of discovery to these regions was begun by the Dutch. Quiros' great discoveries affected cartography so slightly, that I cannot name any single map from the first part of 17th century, where they are registered. Nor do the names he gave to the newly discovered islands and countries seem to have been retained.

Besides the numerous maps previously mentioned which give information concerning the views held by the learned geographers about Terra Australis during the 16th century, I must also call the attention of the reader to a remarkable map of the world (on Bordone's oval projection?), by the celebrated geographer and quarrelsome reformer-theologian from the Netherlands, PETRUS PLANCIVS. The countries of the globe are here divided into six continents: Europa, Mexicana, Africa, Peruana, Asia, Magellanica. As an emblem for the last-named part of the world, *i. e.* for the South Polar Land, on the lower edge of the map there is engraved a landscape, containing elephants, palms, a parrot, a bird of Paradise (foot-less) etc. The original of 1592, probably a large wall-map, I have not seen, but it is minutely described by M. BLUNDEVILE (*His Exercises* etc., London 1597, fol. 251—286). Among other things Blundevile gives a translation in English of the curious legends on the map, *e. g.* "The Ile of Crockland (=Greenland) the inhabitants whereof say that they had their originall from Swethland."

Blundevile's "Treatise" is accompanied by a special leaf in which he makes the following announcement concerning this map and his own book: "A plaine and full description of Petrus Plancius his vniuersall Map, seruing both for sea and land, and by him lately put forth in the yeare of our Lord

1592. In which Mappe are set downe many more places, as well of both the Indies as of Afrique, together with their true Longitudes and Latitudes then are to be found either in Mercator his Mappe, or in any other moderne Map whatsoever, and this Map doth shew what riches, power or commodities, as what kinds of beastes both wilde and tame, what plants, fruits, or mines any Region hath, and what kinds of marchandizes do come from euery Region. Also the diuers qualities and maners of the people, and to whom they are subiect. Also who be the most mightie and greatest Princes of the world: A Mappe meete to adorne the house of any Gentleman or Marchant that delighteth in Geographie, and therewith this Booke is also meete to be bought, for that it plainly expoundeth euery thing contained in the said Mappe."

Afterwards a copy, on a reduced scale, with projection changed and many of the legends omitted, and signed *Auctore Petro Plancio 1594 . . . Ioannes a Duetecum junior fecit*, was introduced into some editions of Linschoten's *Itinerarium*. The map is also spoken of in a letter to Ortelius from Bonaventura Vulcanius, dated Sept. 4th 1592 (*Abrahami Ortelii . . . Epistulae*, ed. J. H. HESSELS, Cantabrigiae 1887).

The intellectual development fostered by the heroic struggle for independence in the Netherlands exercised a powerful influence on the commerce and navigation of the country. The old commercial bounds, at first greatly reduced by the war with Spain, were soon found too limited for the new spirit of enterprise which animated the people. It was deemed necessary to enlarge them by direct communication with the countries of Eastern Asia, so rich in valuable goods. At first attempts were made to reach these countries by the north-west, north, or north-east route, but these having been unsuccessful a number of expeditions were equipped in 1595 so as to reach them by some of the old sailing-routes round the Cape of Good Hope or through the Magellan Straits. It does not enter into the plan of this work to give an account of the final success of these commercial enterprises, how they led to the establishment of rich commercial companies at home, and important trading-stations and colonies in Australasia. Here we only have to take into consideration the influence on the knowledge of our globe and above all on the mapping of its countries and seas exercised by the Dutch commercial voyages. Those voyages which are of most importance as regards the history of discovery in Australia or New Holland, and above all those the memory of which has been preserved by inscriptions on maps and charts are as follows:²

1605. The yacht Duyfken was dispatched from Bantam with the object of more closely exploring the great South Land. It sailed along the west coast of Australia and New Guinea from 13³/₄° to 5° S. lat. The coast was mostly found to be uninhabited, but at some places there were cruel black natives who murdered a part of the crew. The place where the Duyfken turned was called Cape Keer-Weer.

¹ In PURCHAS, Vol. IV, p. 1432 we find: *A note of Australia del Espíritu Santo, written by Master Hakluyt*. Quiros' name for the fifth continent, afterwards abbreviated to Australia, was thus adopted in England during the commencement of 17th century. Moreover *Terra Australis recenter inventa* sed *nondum plene cognita* occurs on Orontius Finaeus' map of the world of 1531. The name *Nova Hollandia*, so far as I know, is first met with on the map of the South Polar regions in the edition of JANSSONIUS' atlas of the year 1657. This map is printed from the same plate as the map in the 1650 edition (N. T. LVIII), but "Nova Hollandia", "Ant. van Diem. Landt" and "Nova Zeelandia" have been added by the engraver (N. fig. 100).

² These voyages, of which but little is known, are here cited mostly from the instructions given to Abel Tasman, dated Batavia, January 29th, 1644, and signed by Antonio van Diemen and others. First printed in DALRYMPLE'S *Collection of memoirs concerning the land of Papua*, from a MS. in the library of Sir Joseph Banks (BURNLEY, II, p. 314; III, p. 178), afterwards in an English translation by R. H. MAJOR in *Early Voyages to Terra Australis*. A careful comparison of all that is known at present concerning these voyages is made by ARMAND RAINAUD in *Le Continent Austral, hypothèses et découvertes*, Paris 1893, and GEORGE COLLINGRIDGE, *The discovery of Australia*, Sydney 1895. In the work last mentioned there are numerous reproductions of maps.

The earliest maps or charts on which the Dutch discoveries in the South Pacific are laid down are: 1. An engraved map by HESSEL GERRITSZ. 1627. Only one copy of it is extant, and is in the State Archives at the Hague. 2. A MS. map in the same Archives, drawn by ARENT MARTENSZ. DE LEEUW, chief pilot on the voyage of Jan Carstensen. with the Arnhem and Pera in 1623. 3. A map of the world already mentioned on p. 153, drawn in 1630 by PHILIP ECKEBRECHT at the request of, and in collaboration with J. KEPLER. It is often inserted in the *Tabulae Rudolphinae*, Ulmae 1627, in COOTE-MULLER'S *Remarkable maps*, Part. II—III, Amsterdam 1895.

The Duyfken left Bantam on November 8th 1605, and on her return-voyage came to Banda before June 15th 1606 (PURCHAS, I, p. 385). After the separation from Quiros in the Baya de San Felipe y Santiago, Torres sailed to the strait between New Guinea and New Holland at the end of June 1606. If these data be correct the commander of the Duyfken was the true discoverer of the mainland of Australia. His name was William Jansz. (COOTE-MULLER, *op. cit.*, *Introduction and Notes on Part II*).

1616. Dirk Hartog or Hertog, on board the Eendracht, during a voyage from the Netherlands to the East Indies, touched at the west coast of Australia between 23° and 26° S. lat.

In 1617 the "Fiscaal" Jan Edels sent an expedition from Bantam to explore the new coast. The legend "Edels Landt" on the west coast of Australia in Dutch charts seems to be the only notice of this voyage that occurs in literature.

In 1618, 1619 and 1622 many vessels (Mauritius, Dor-drecht and Leeuwin) touched at the Australian coast between

the coast. She then ran aground, so that a good part of her valuable cargo had to be thrown overboard.

In 1629, on the 4th of June, the ship Batavia, with Francis Pelsaert as master, was stranded at Houtmans Abrolhos (28° S.). Pelsaert sailed thence by boat along the west coast of Australia to 22° 17' S., landing with great difficulty at several places on the desert sandy shore. There he left the coast and steered directly to Batavia, where he procured a new ship, with which he returned to Australia to fetch the shipwrecked men and women left on some small islands near the shore. Unfortunately mutiny had broken out among the crew during the absence of the commander. Several men had been killed and the valuable cargo plundered. Pelsaert quelled the rebellion and punished the mutiners with great severity. A number of the most guilty were hanged. It was evidently these deplorable events that caused the publication of a detailed description of the unfortunate voyage and not the circumstance that an extensive tract of Terra Australis had been explored.



99. "Carta particolare dello Stretto di Magellano e di Maire." From *Arcano del mare*, Tome III, Firenze 1647. (Original size 0.742 x 0.467 m.)

22° and 35° S., when sailing from the Netherlands to their Asiatic colonies.

In 1623 the yachts Pera and Arnhem were sent on an exploring expedition to the vast unknown southern country, this time from Amboina, under the command of Jan Carstensz. The skipper and eight of the crew of the Arnhem were killed by the natives. The Arnhem then returned, but the Pera continued her voyage and explored the west coast of the country to 17° S. lat.

In 1627 the south coast of the vast continent was discovered by chance and explored to the extent of 1000' during the outward-bound voyage of the ship Gulde Zeepard. Pieter de Nuytz was supercargo during this voyage.

In 1628 the ship Vianen, under the command of Gerrit Fredericsz. De Wit, when homeward-bound from India, reached the north side of Australia, at 21° S., and sailed 200' along

In 1636 two yachts, the Amsterdam and the Wesel, started from Banda, under the command of Gerrit Tomasz. Pool, to explore the country to the east and south. They sailed from 3 1/2° S. lat. along the coast in an easterly direction to 5° S. lat., when, as seems to have been usual on these expeditions, the captain and three of the crew were murdered by the natives. The voyage was continued under command of the supercargo Pieter Pietersz., who took the vessel back to Banda, "without having made any important discoveries". During this voyage the large Gulf of Carpentaria, named after the Dutch Governor Carpenter, seems to have been, if not discovered, at all events mapped as regards its chief features.

Extensive parts of the coast of Australia were visited for the first time during these Dutch voyages (1605—1636), and most of them by names on bays, capes, islands, or

shores are registered on charts of the 17th century, *e.g.*, by Janssonius, Blaeu, Goos, and Van Keulen. They have therefore been enumerated here, though, with the exception of Pelsaert's shipwreck, they were for a long time so completely overlooked in the history of navigation that Van Diemen's instructions to Tasman form almost the only original record of them.

1642—1644. The exploring voyages of Abel Jansz. Tasman, equipped from Batavia by order of the Governor, Antonio van Diemen. The first and most important was undertaken in 1642—43. Tasman sailed round Australia and discovered Van Diemens Land and Statenland, afterwards called New Zealand. It is characteristic of the notions about the geography of the southern hemisphere which prevailed in the middle of the seventeenth century, that this Statenland was still considered as forming part of the south Polar continent and thus as connected with that Statenland which was separated from Tierra del Fuego by Le Maire's Straits. The name of Van Diemen was also applied to a cape and a river in the Gulf of Carpentaria. A long time elapsed, before an account of the voyages of Tasman was published. But the important results were inserted in the chart of JANS-SONIUS of 1657 (N. fig. 100) and in other Dutch charts and maps of the latter part of the 17th century. A tolerably complete

chart showing the discoveries of Tasman and his predecessors in New Holland, Van Diemens Land, and New Zealand is also in several Dutch commercial reports, the voyage (together with several Dutch commercial reports, the voyage of "Général" Beaulieu to the East Indies 1619—1622, a Portuguese sailing-direction to the Spice Islands etc.) inserted in THEVENOT'S *Relations de divers voyages curieux*, Paris in 1666. This map is here reproduced on a reduced scale in fig. 98. Concerning these voyages of exploration, of which the first is one of the most successful and important recorded in the history of geographical discovery, I must refer the reader to BURNES, Vol. III, pp. 59—112, where an English translation of Tasman's diary is given, as also references to the older literature. During Tasman's second voyage in 1644, the great navigator made a vain attempt to penetrate to Van Diemen's Land by the northern route through the Gulf of Carpentaria.

The voyages of Tasman concluded the Dutch period of discovery. It was rich in results, but as regards the discoveries in the Pacific for a long time by no means duly appreciated. It lasted scarcely more than fifty years but has for all ages immortalized the courage and enterprise of that liberty-loving nation among both the frost and ice of the Polar seas and the sunny islands of the Indian Ocean and the Pacific.



100. Part of the South Polar map in JANSSENIUS' Atlas, Part V, Amstelodami 1657. (Slightly reduced.)

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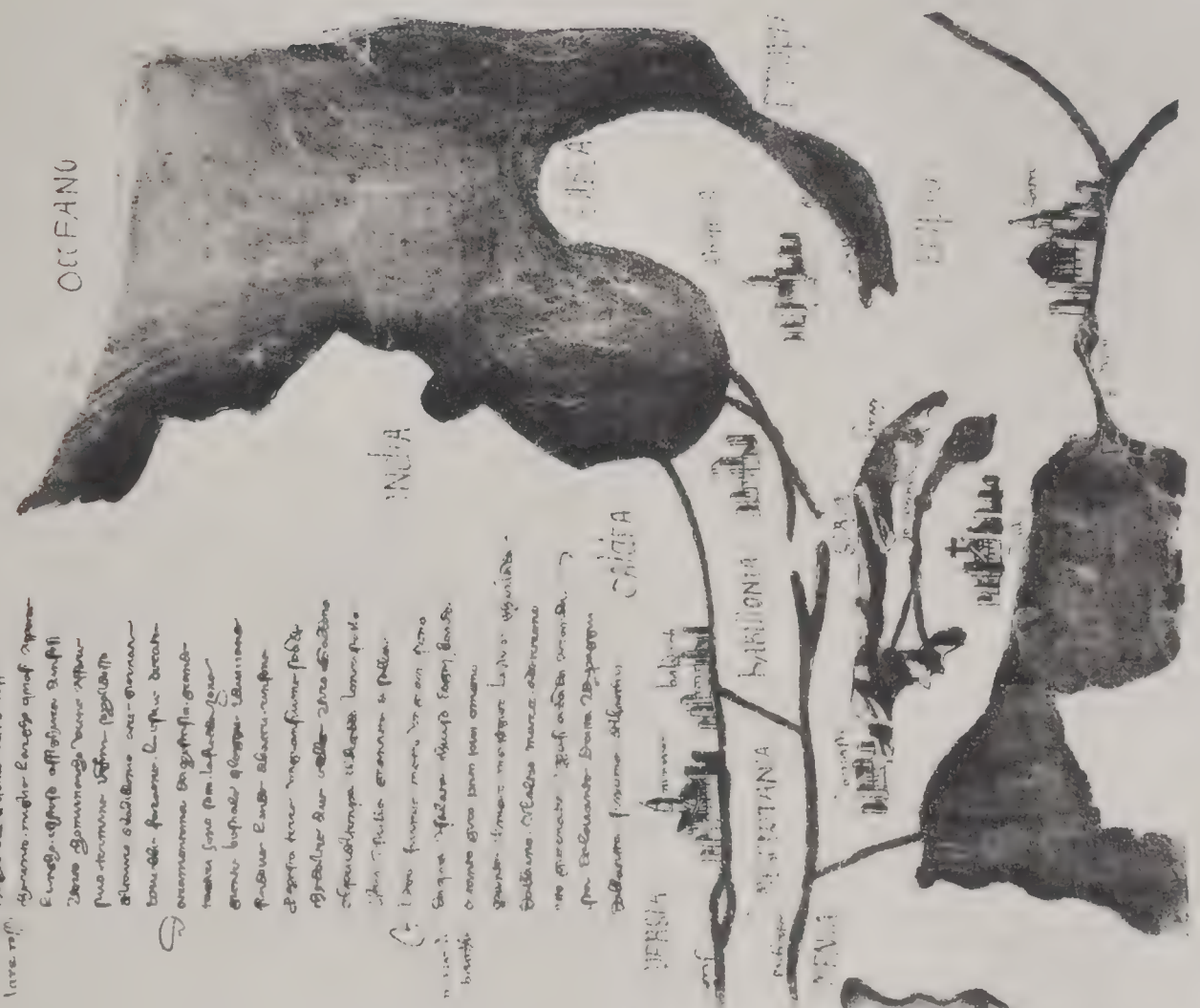
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1. In hoc loco ubi est...
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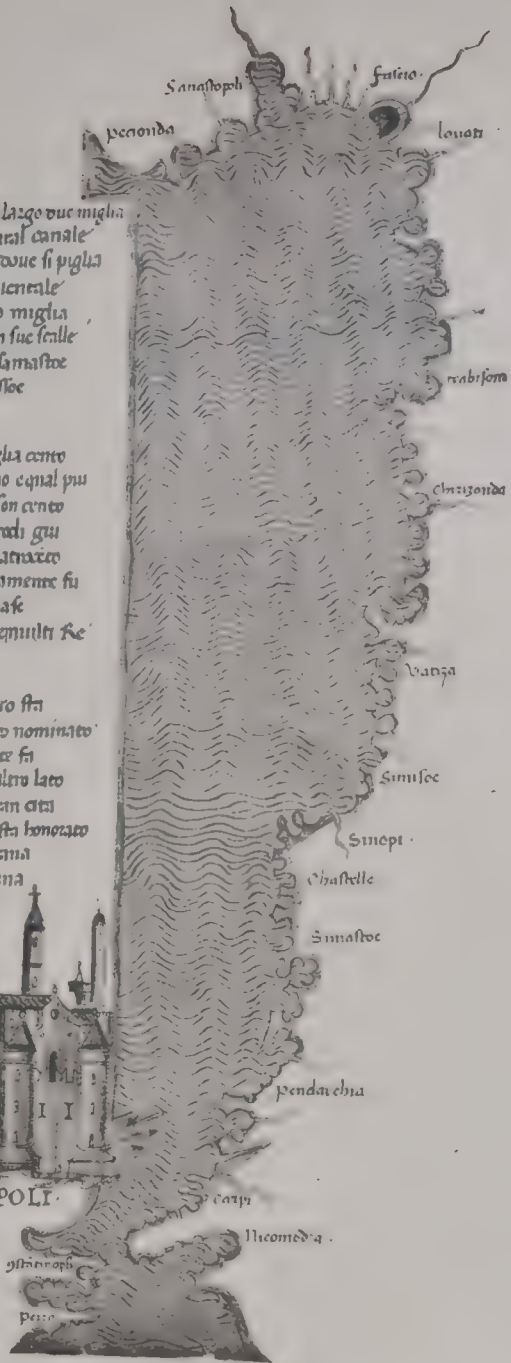
Questa altra bacia ha di largo due miglia
 E uenit ad aquilone dural canale
 E giunge al mar magor doue si piglia
 E quando il suo uerso orientale
 Na costiera nouerento miglia
 E benfina a trachefonda son sue scille
 E appi poi pon denticchia e la mastice
 E affile se noip e e umilice

E sum da luno alatro miglia cento
 No per lato e qual meno e qual piu
 Cusi dal lato mar ande son cento
 Son dal lato i fino va redi giu
 E tra luno mar alatro quatrate
 E questo quando anebriamente fu
 Dico ahi minor e dextero a se
 Hauca molte prouinte emulit Re

Nel capo quasi detto quando fin
 Il monte tbauro che moles nominato
 E quale due corna uer ponete fin
 Che uengon lungo luno elaltro lato
 Nel mezo te eplo e ogni gran citi
 E uasto oue uirgin curcho sta honozato
 A lpaui vi finiso da tramontana
 E quasi al lasso da meridiana



COSTANTINOPOLI



En dalfredo un beaco d'alto mare
 Che per il color del fono, e uero rosso
 Che cento miglia on piu ha a fare
 E uingo e d'istilo a figura d'un fosso
 E certo come un uado e uen a fare
 E uo certuno e confin sopra del fosso
 E d'ebano di babilonia tre giornate
 Doue bebbe pharaon le sue deate

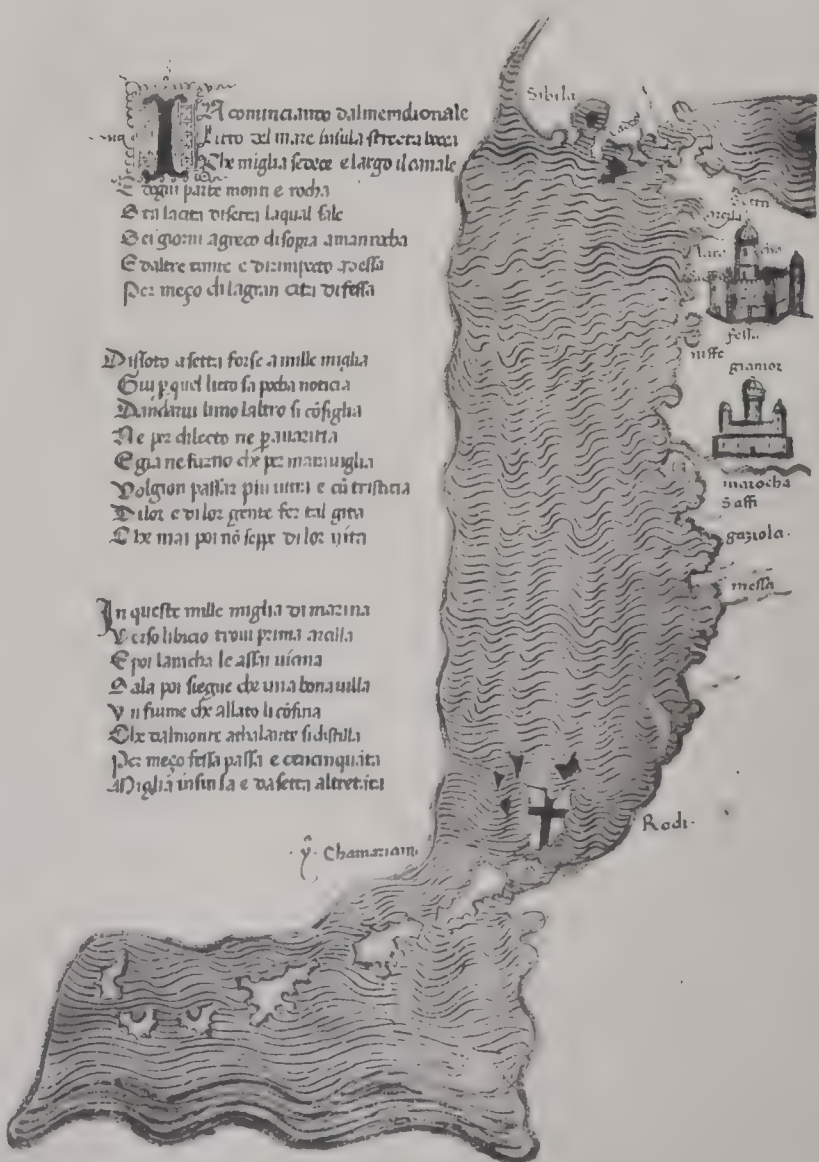
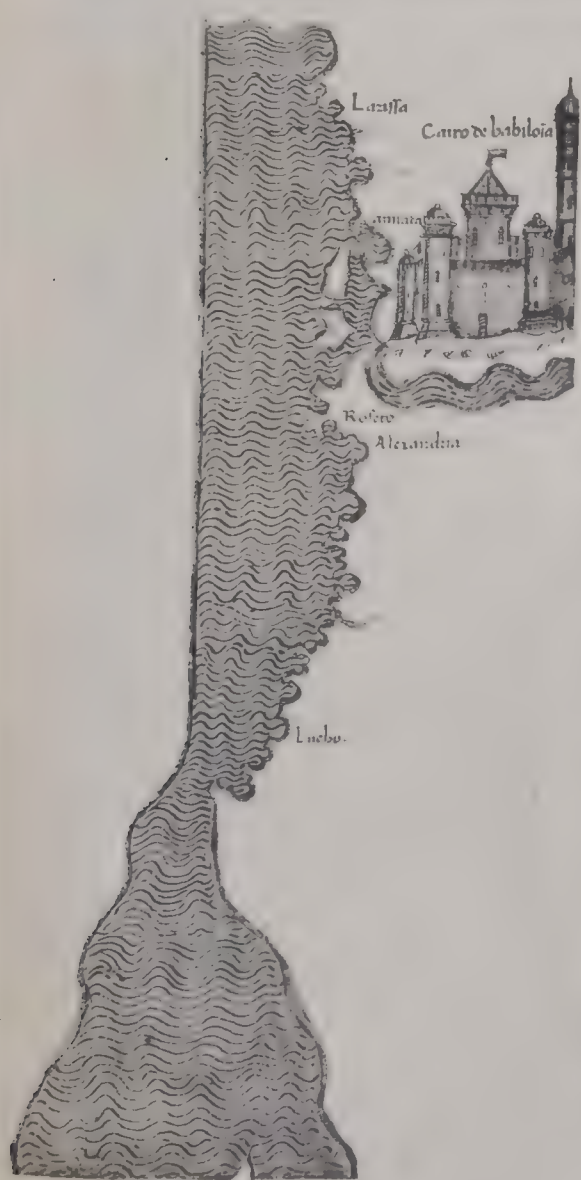
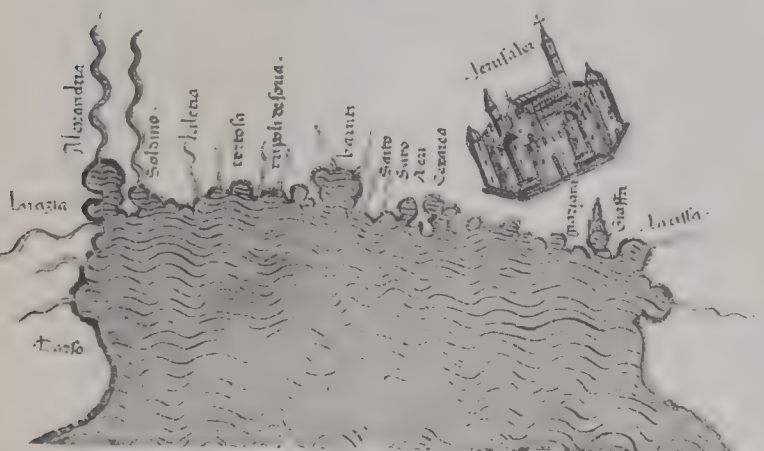
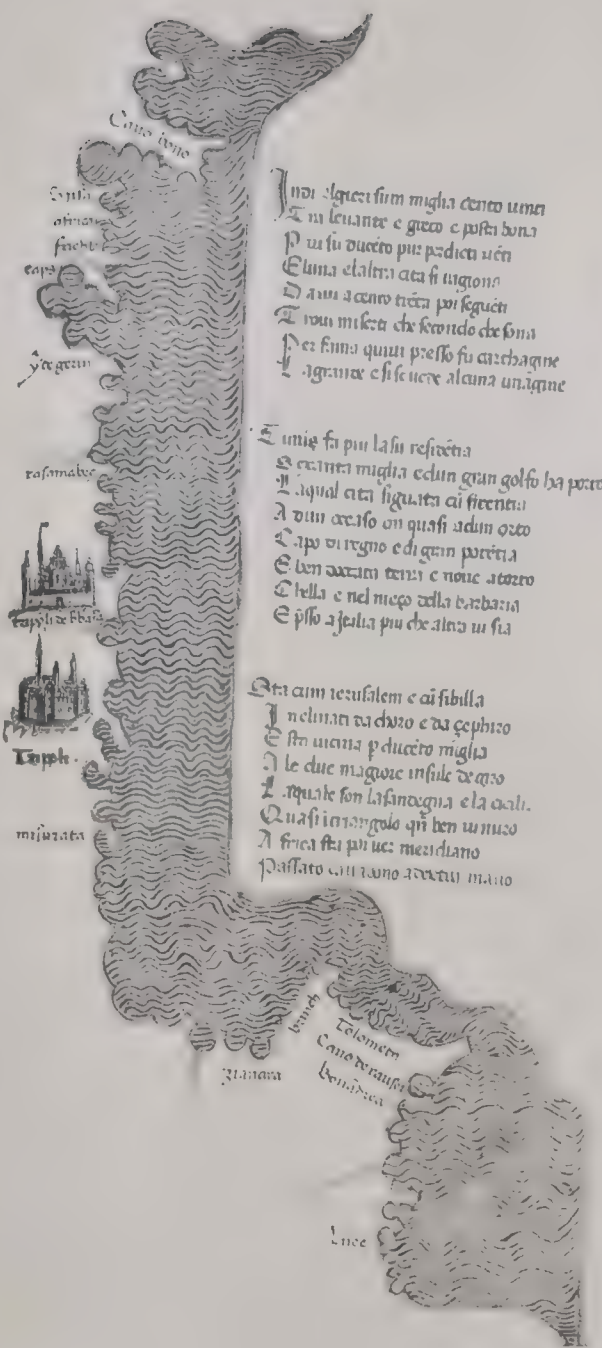
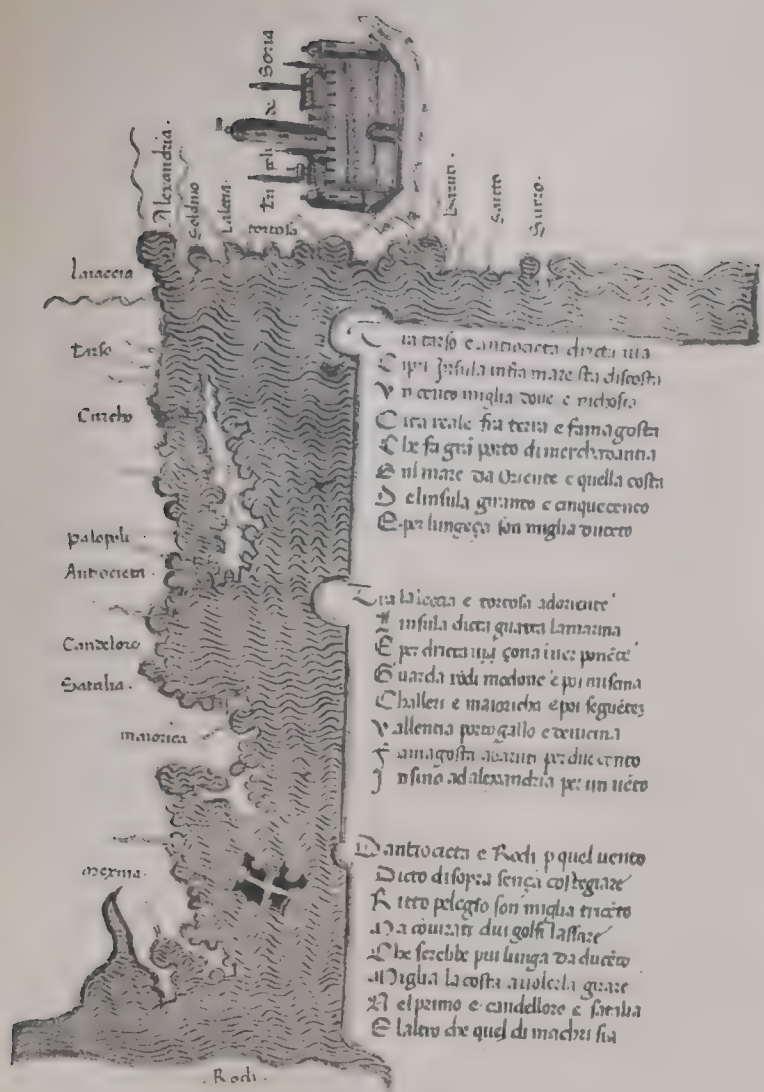
Datimontana di quest'issa giunte
 E d'era sum sotto lafreda con
 E uen d'istilo di logie e te uenante
 E in doue londa di babilonia risona
 E a questi teni un gran fiume si fante
 E piu del tempo e fredo e no uedona
 E d'altre due il dir dico no falla
 E uen su lagim ari di falla

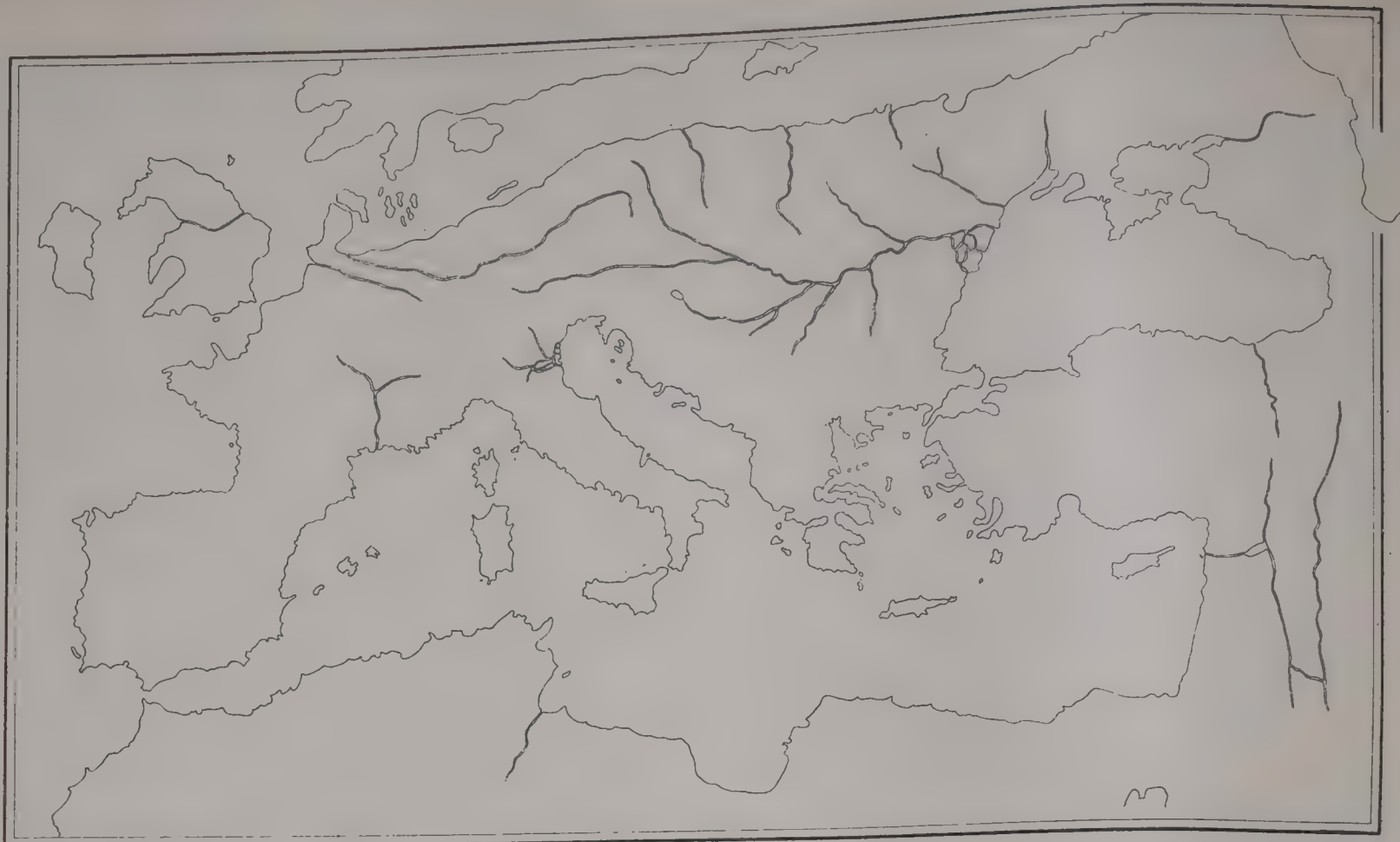
Il dicto fiume mette in un guai sero
 E acqui a salati d'istilo ogni banda
 E uenito giro on puato piu on meno
 E uato e uinas magor la sua giunta
 E a luno alatro mare ha vi tereno
 E uo giornate e quasi adanda adanda
 E d'altre due il dir dico no falla
 E uen su lagim ari di falla

fiume Tigris

fiume Eufrates



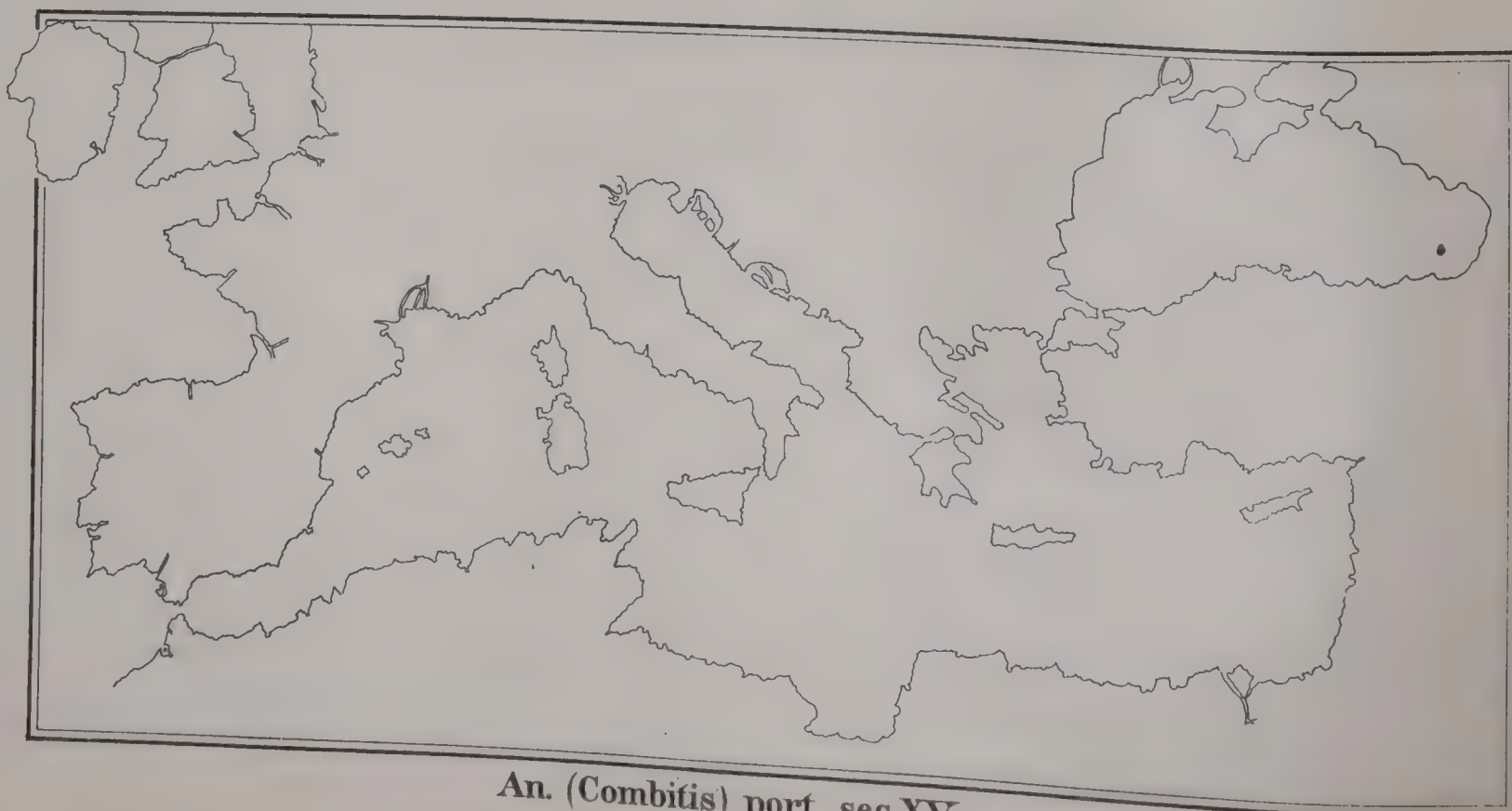




Giovanni da Carignano c.1300.



Portolano Laurenziano-Gaddiano 1351.



An. (Combitis) port. sec.XV.



Petrus Vesconte 1311.



Jachobus Giroladis 1426.



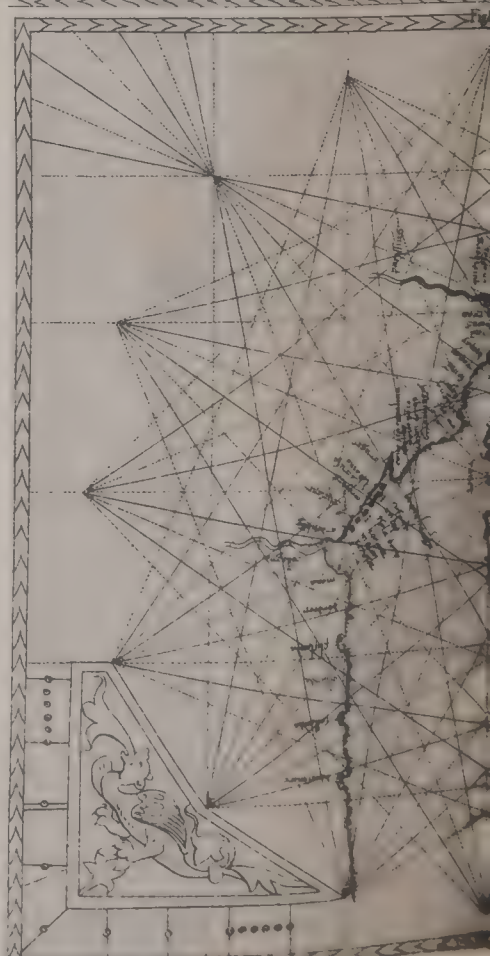
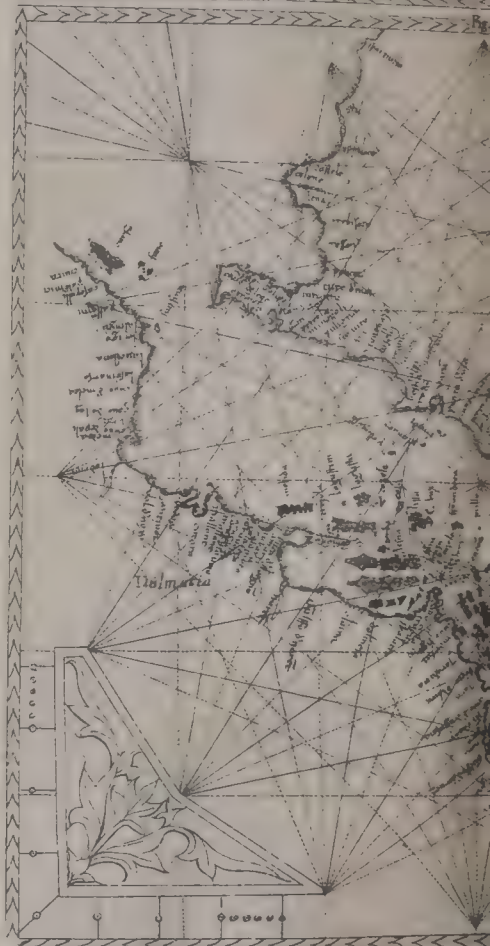
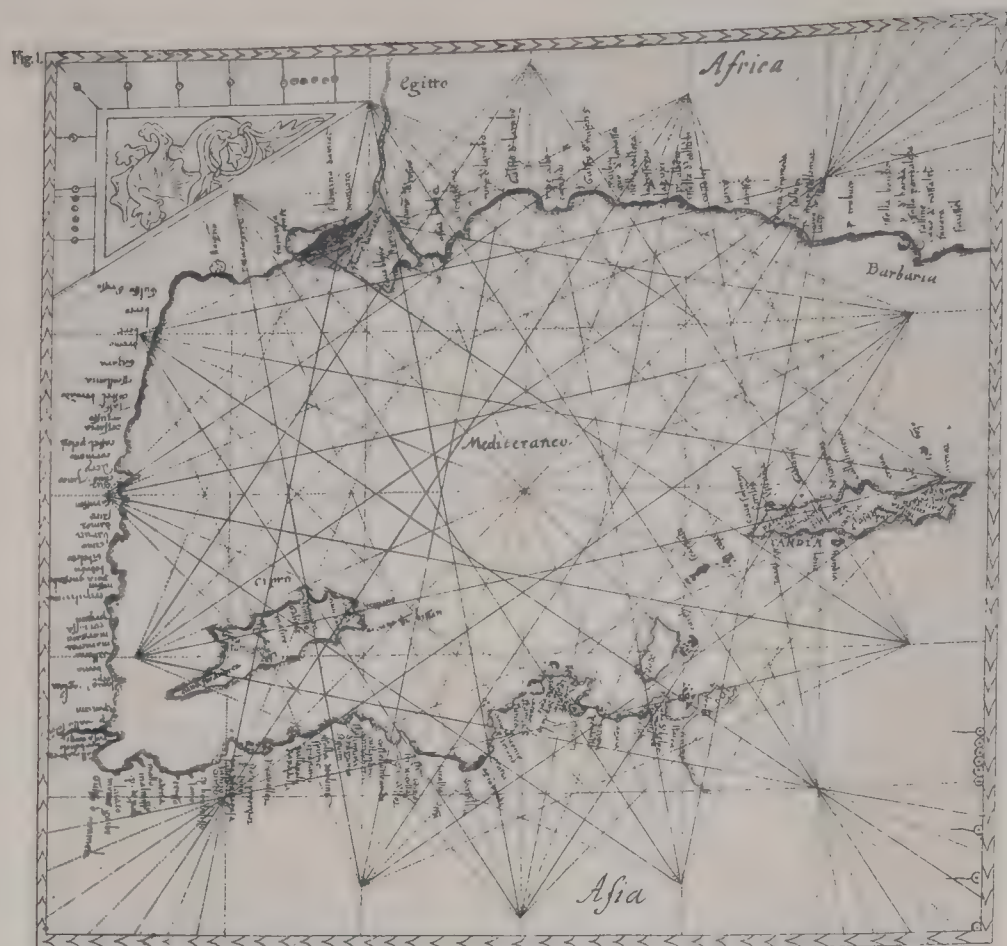
Mappa nautica moderna Maris Mediterranei et Pontici.

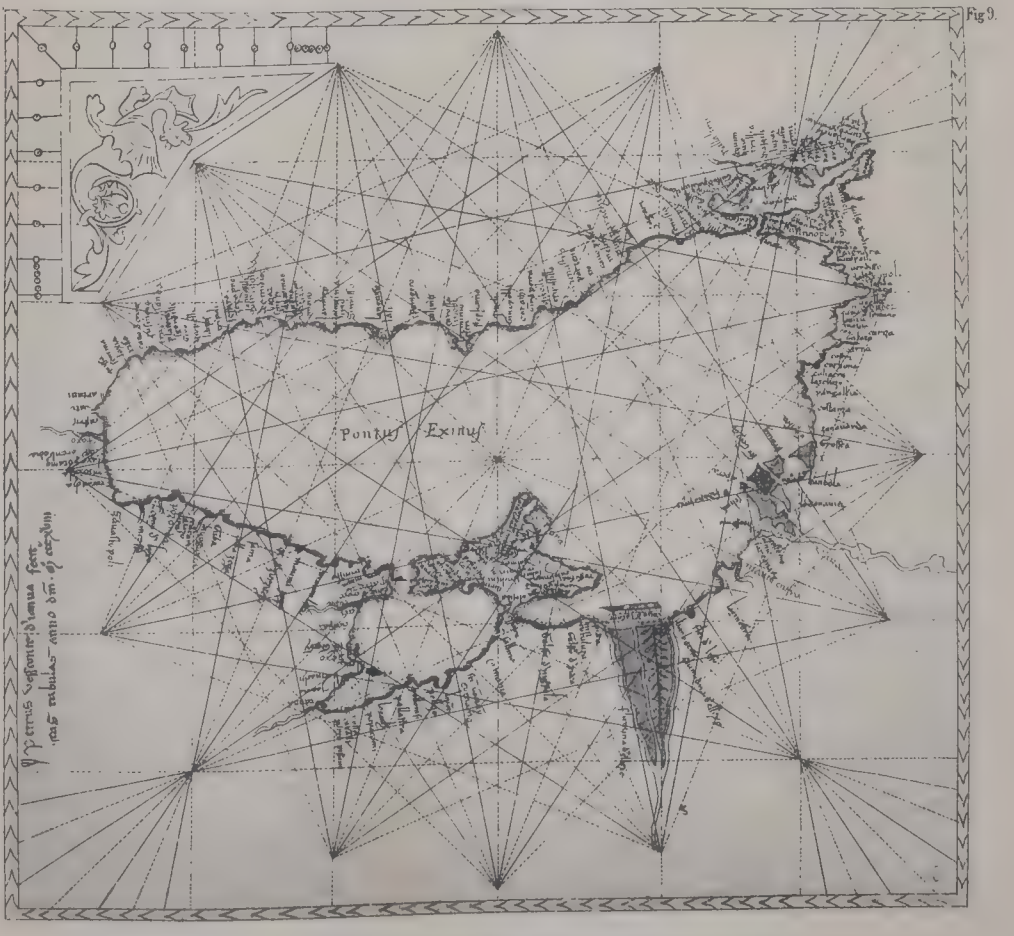
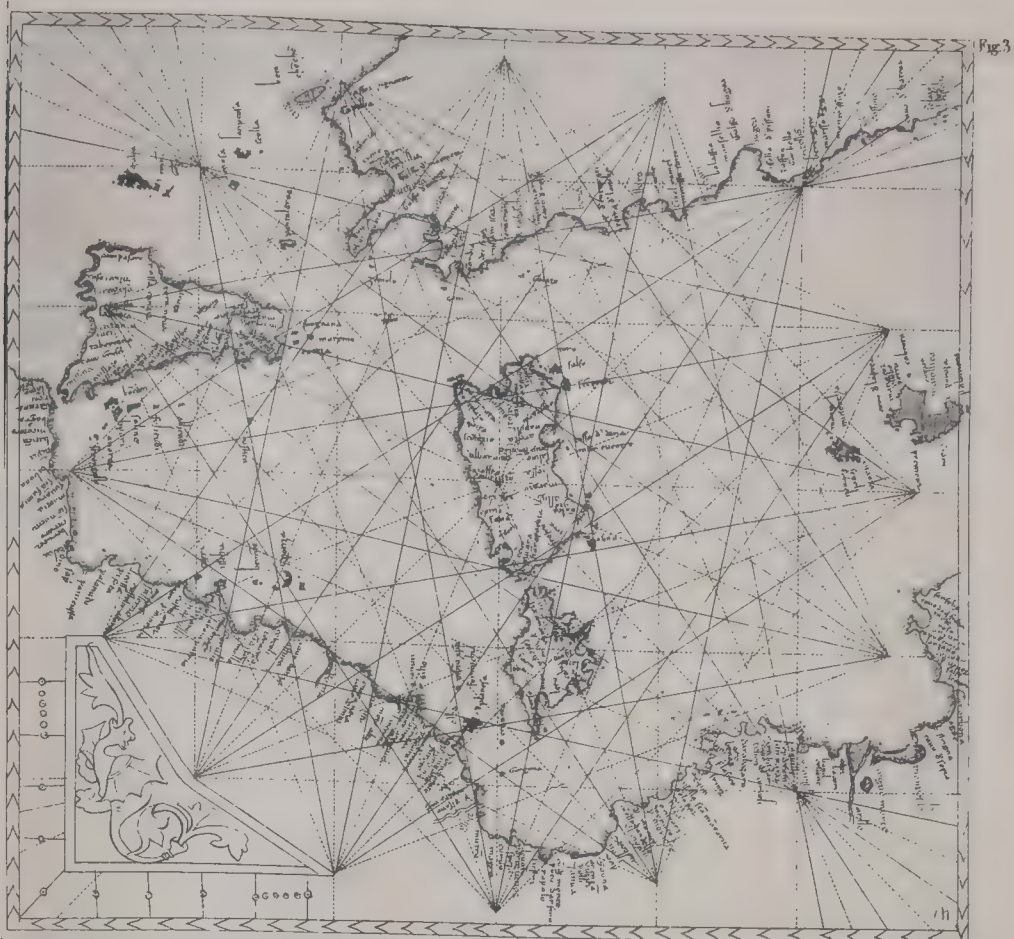
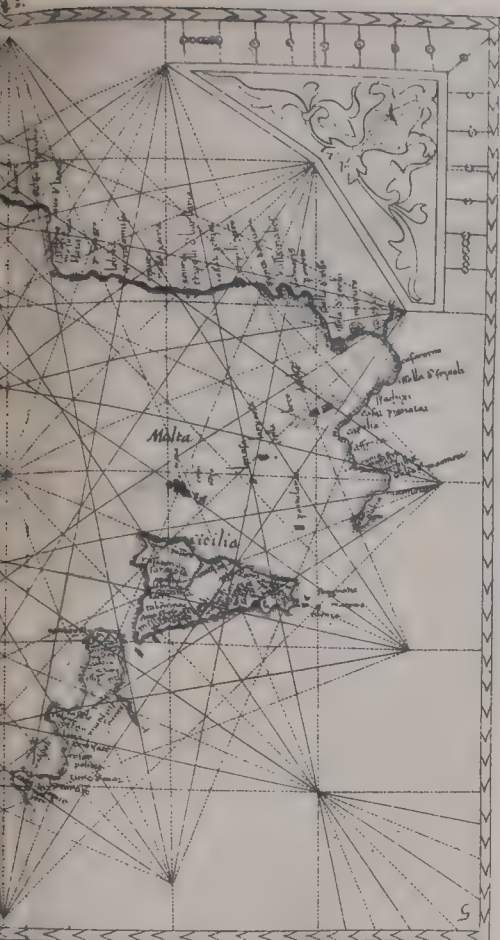


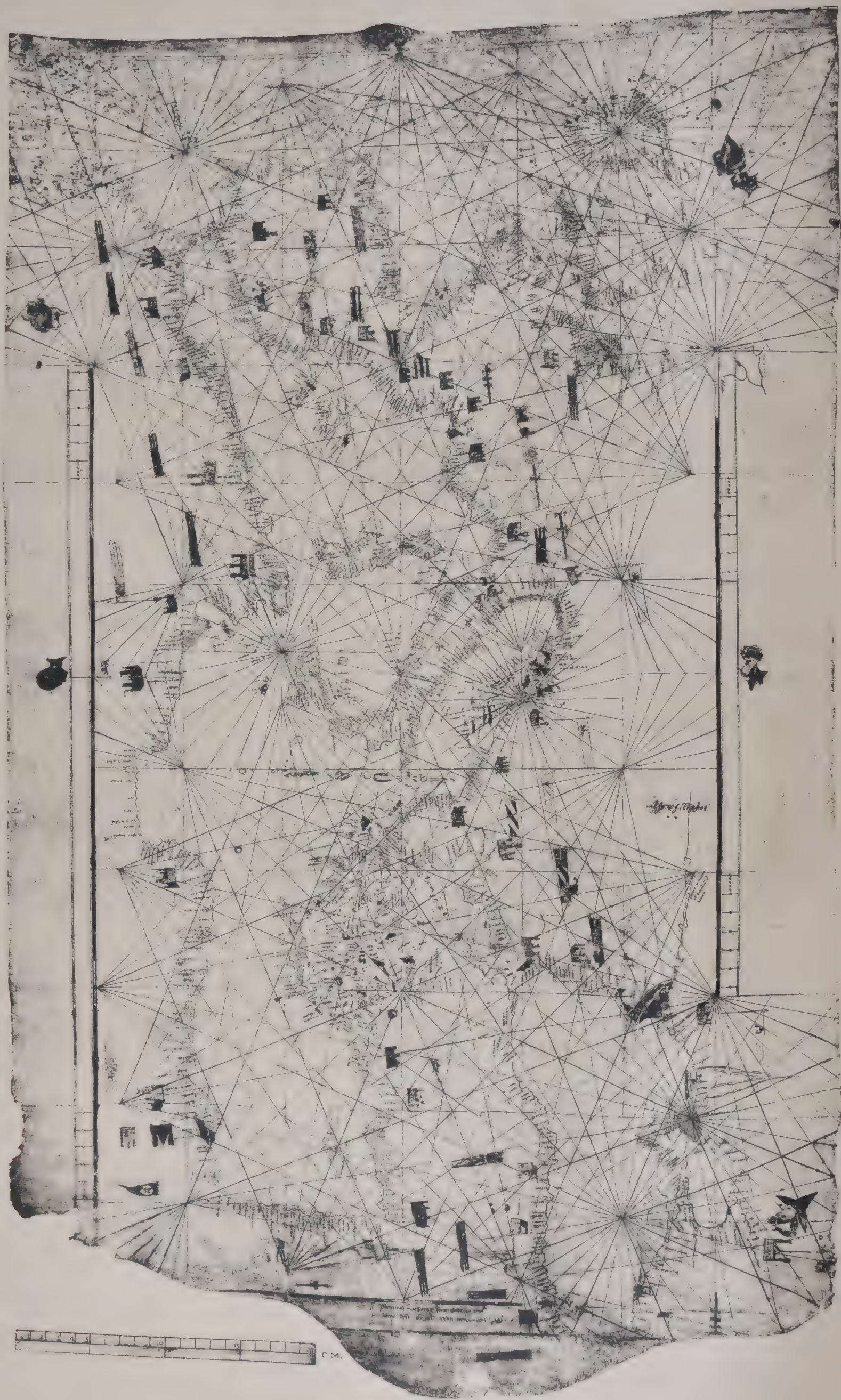
GIOVANNI DA CARIGNANO c. 1300.



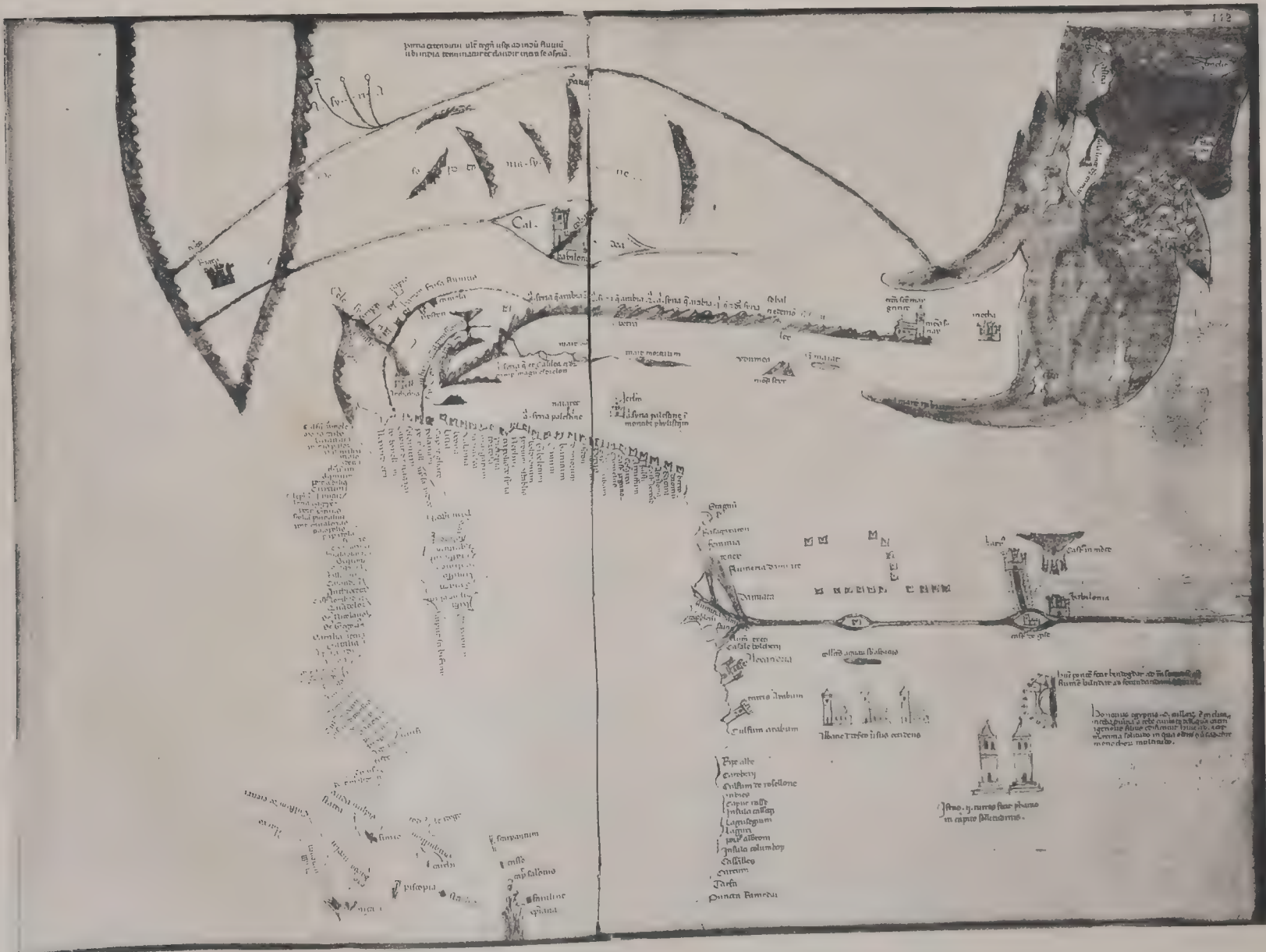
PETRUS VESCONTE 1311.

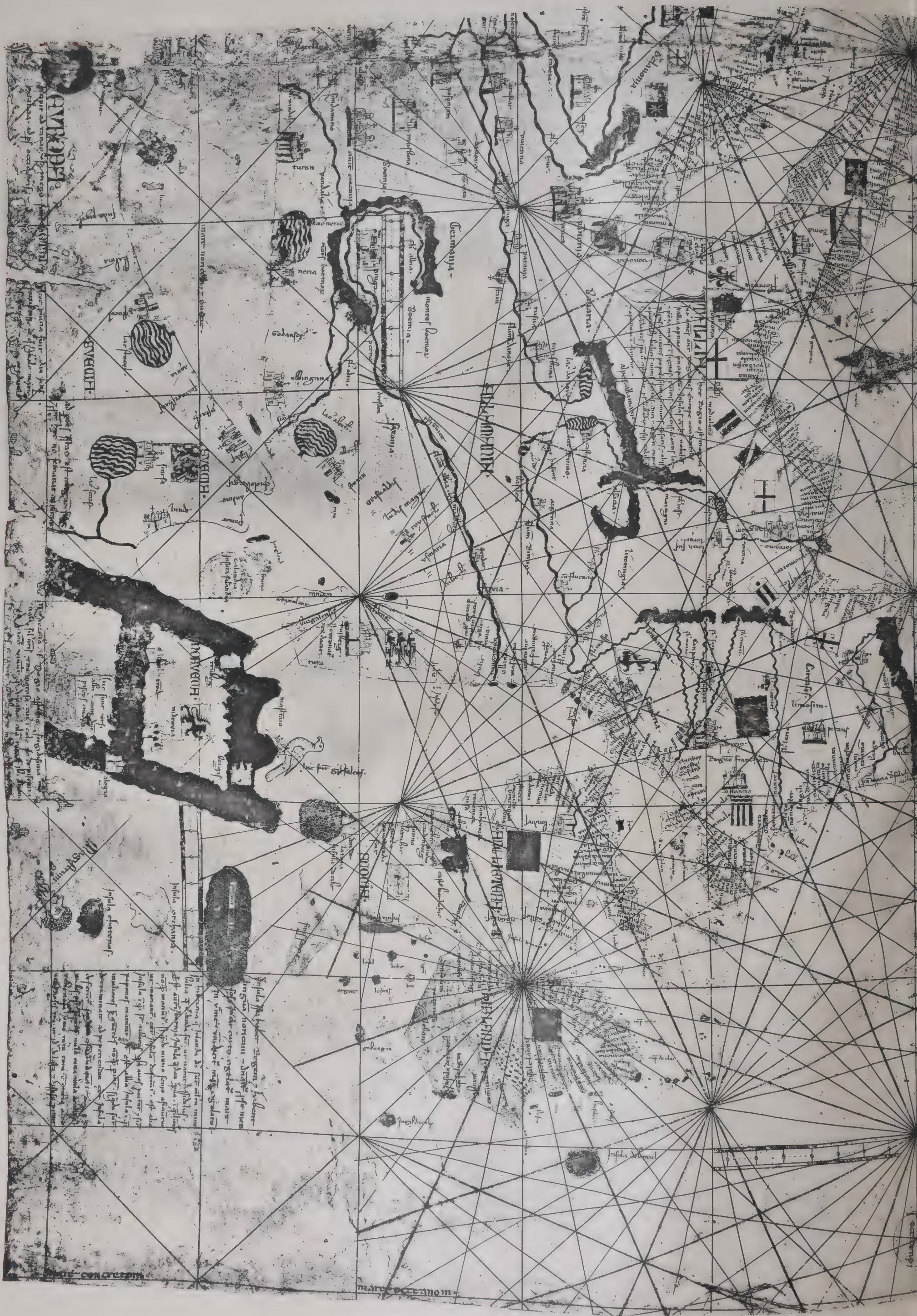






PERRINUS VESCONTE 1327.











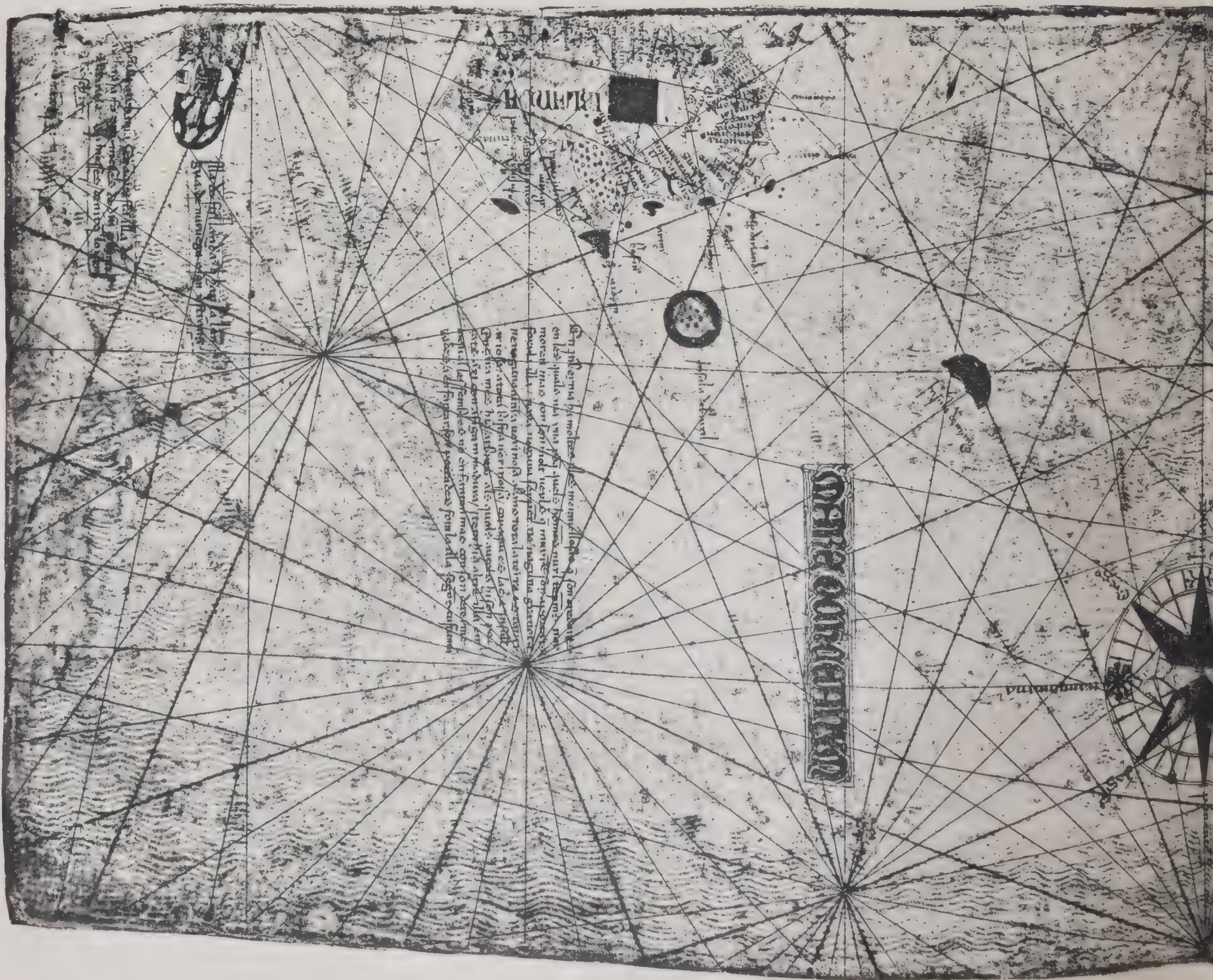
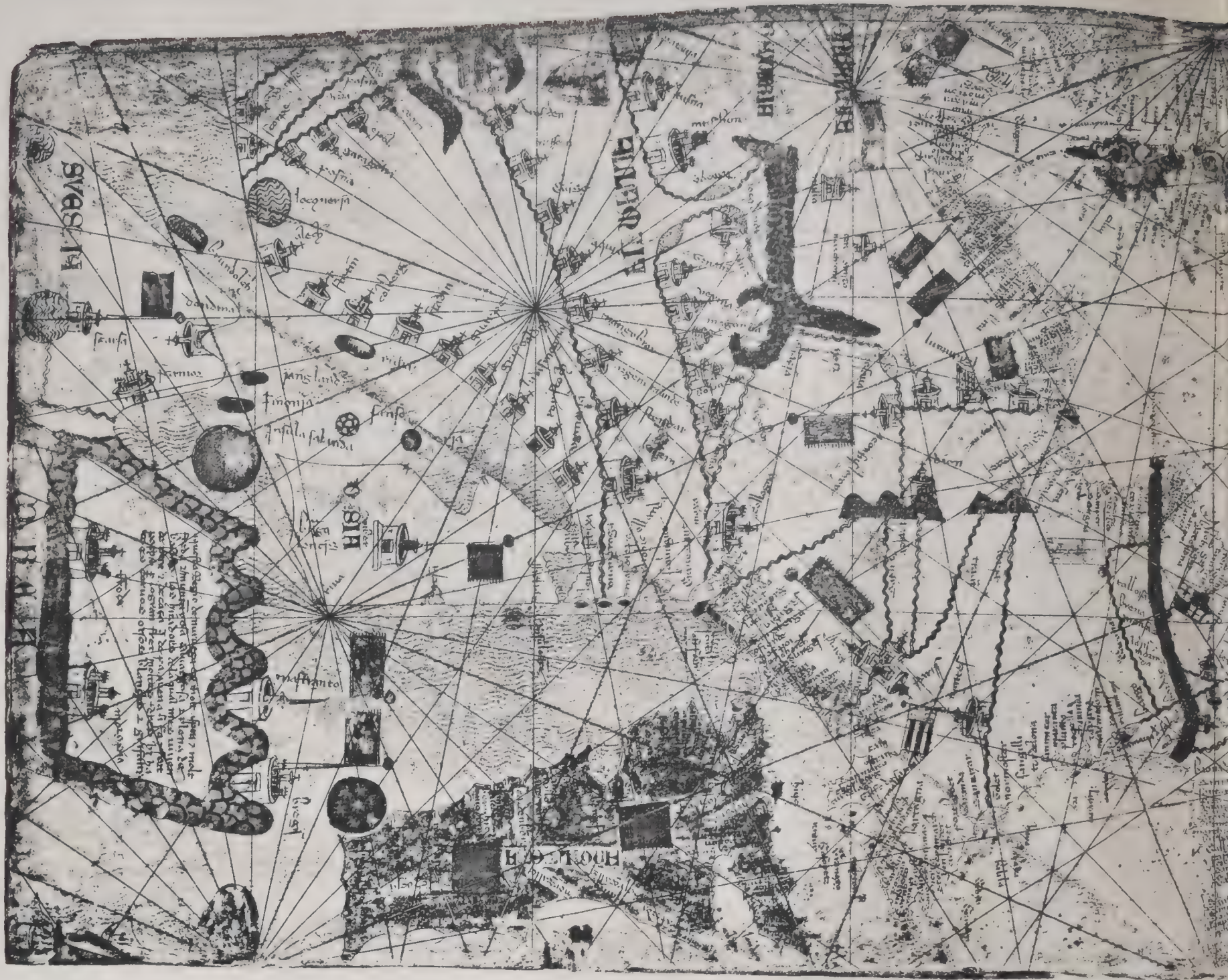


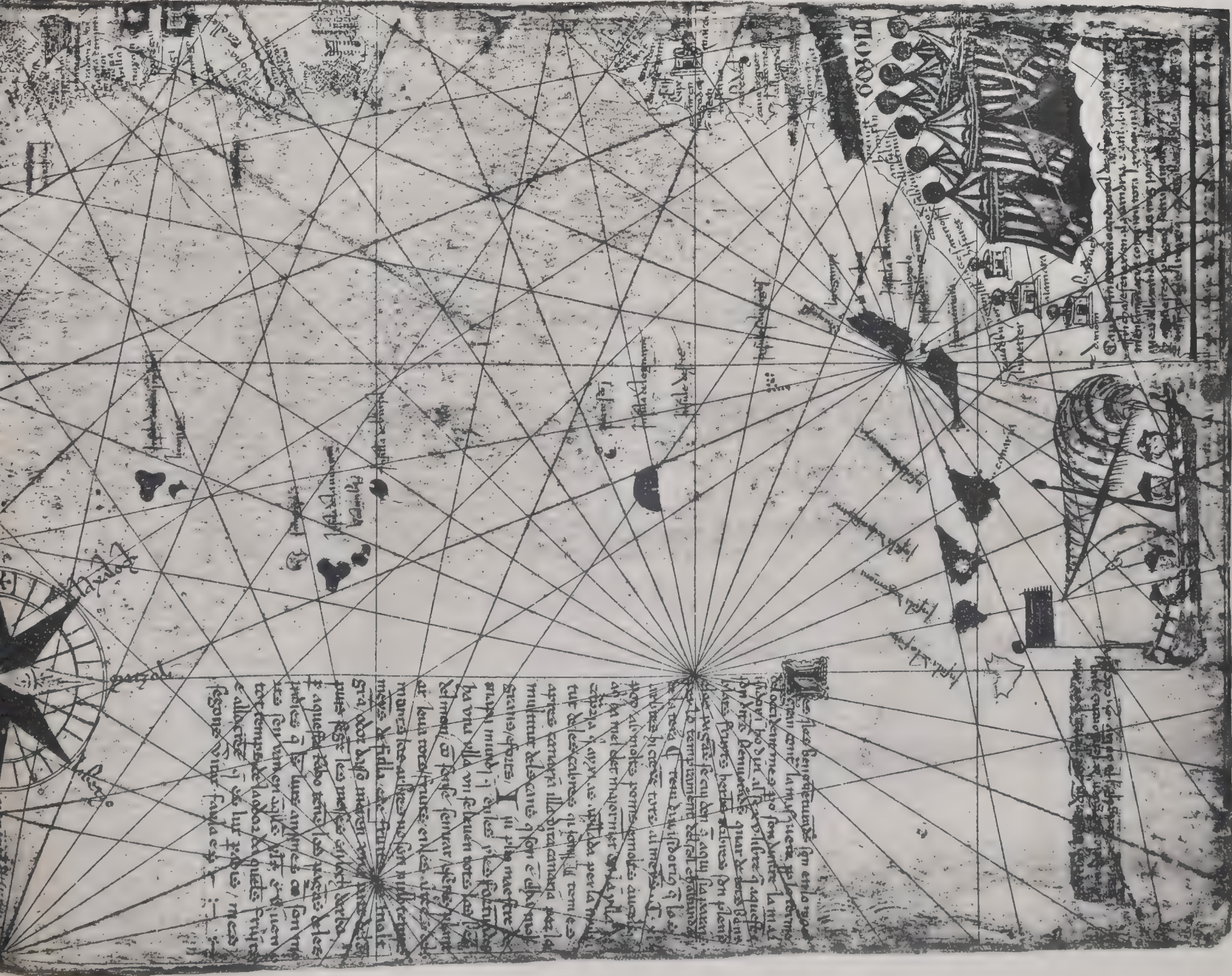
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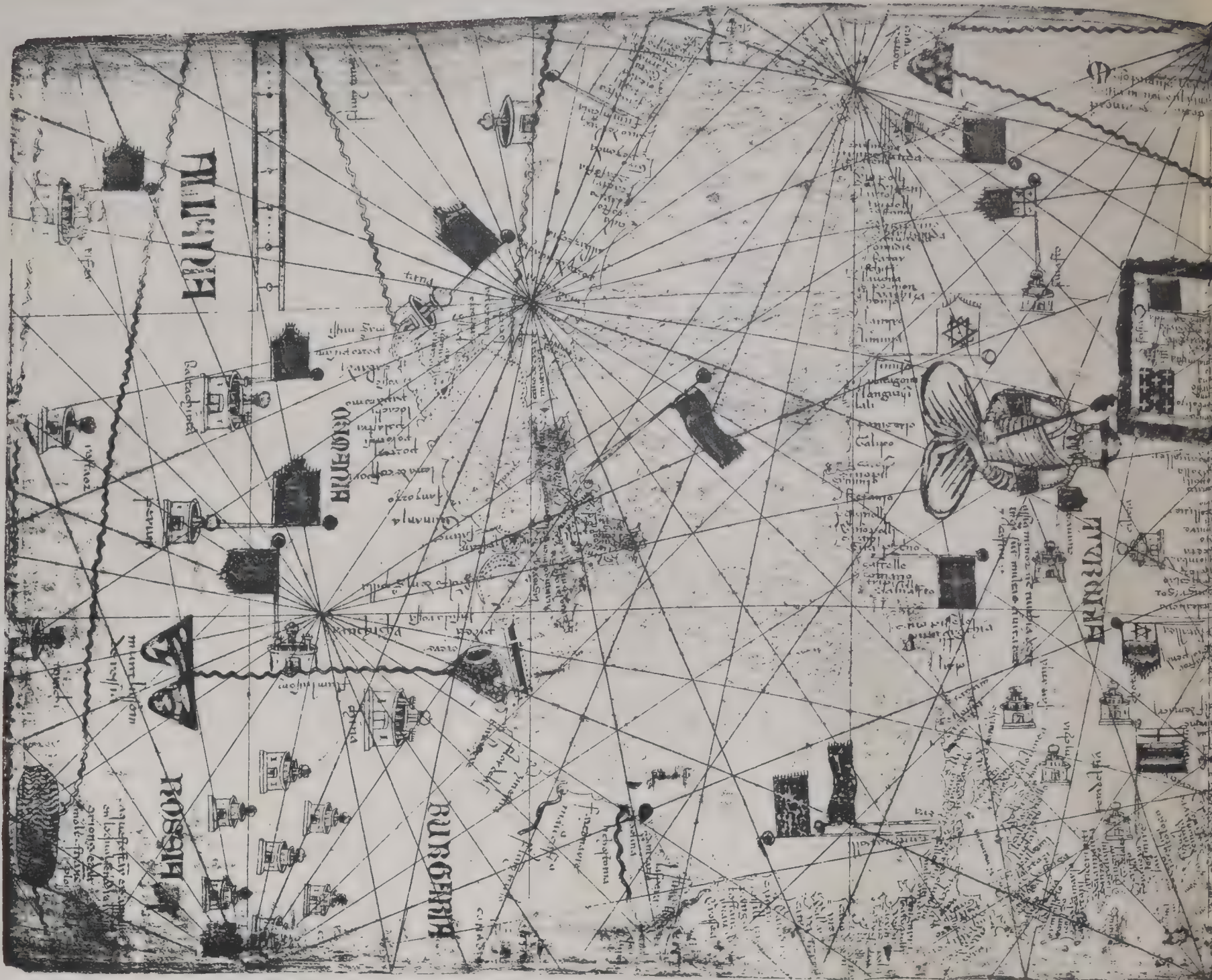
CHARTA NAVIGATORIA
(PORTOLANO LAURENZIANO-GA)

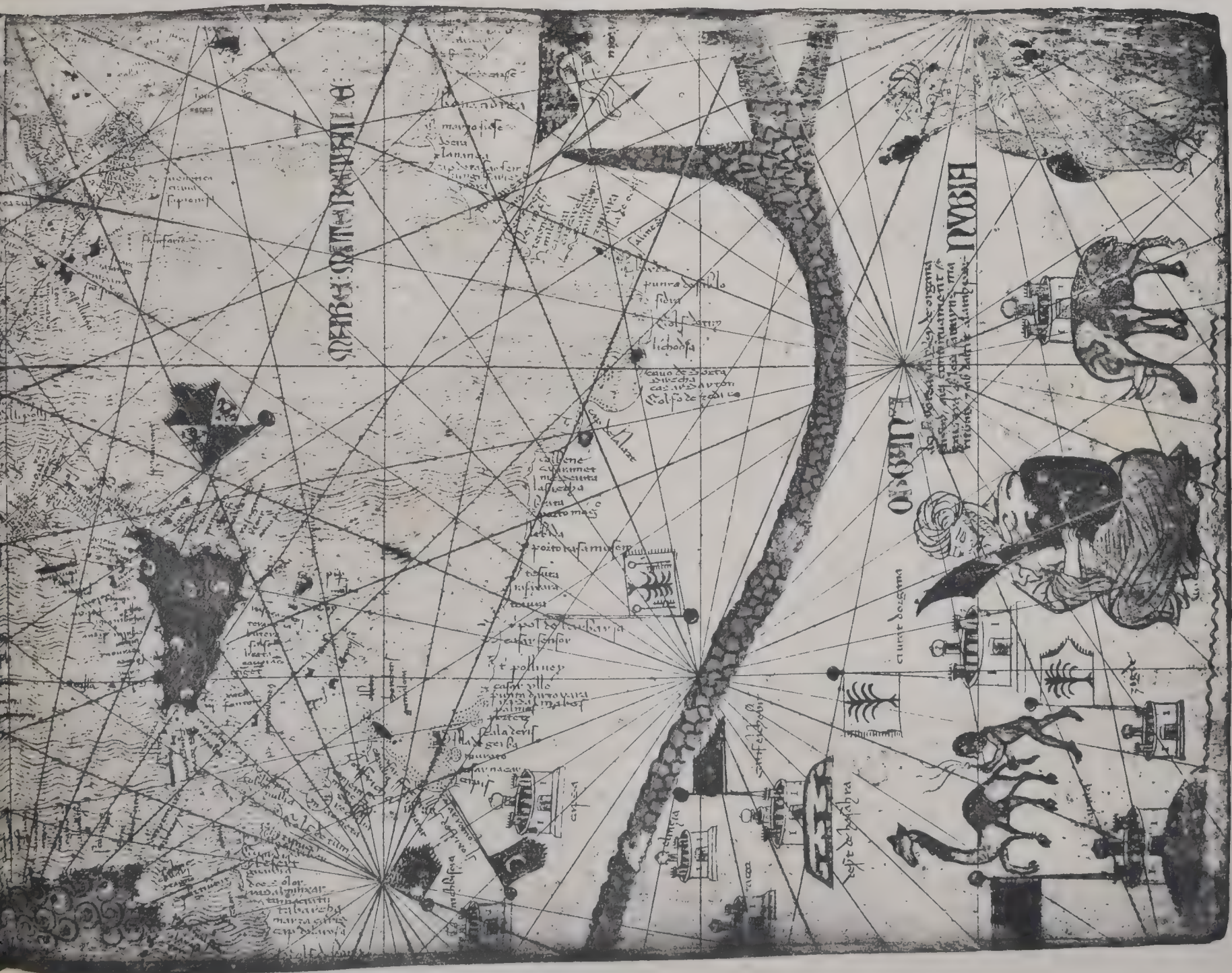


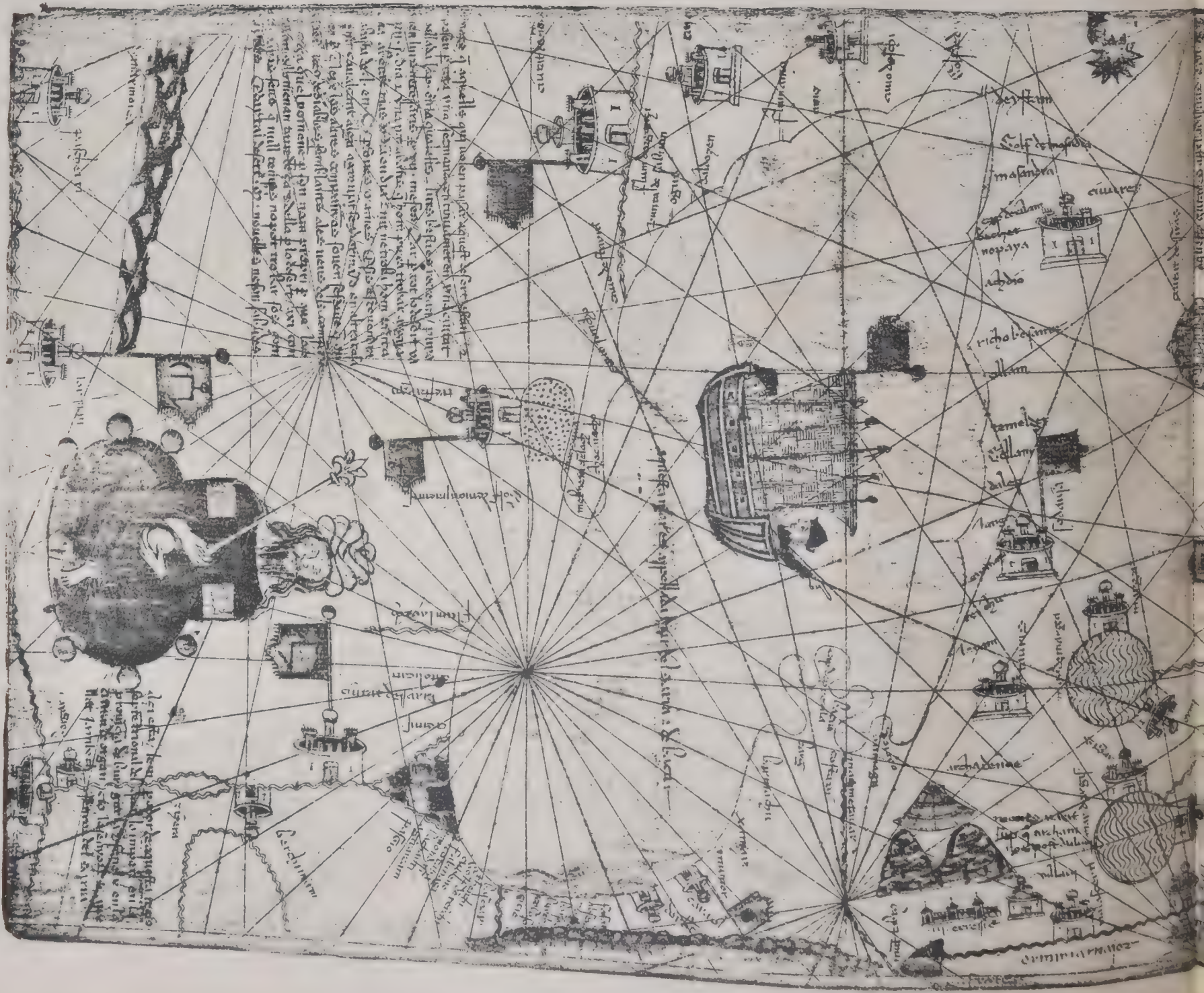
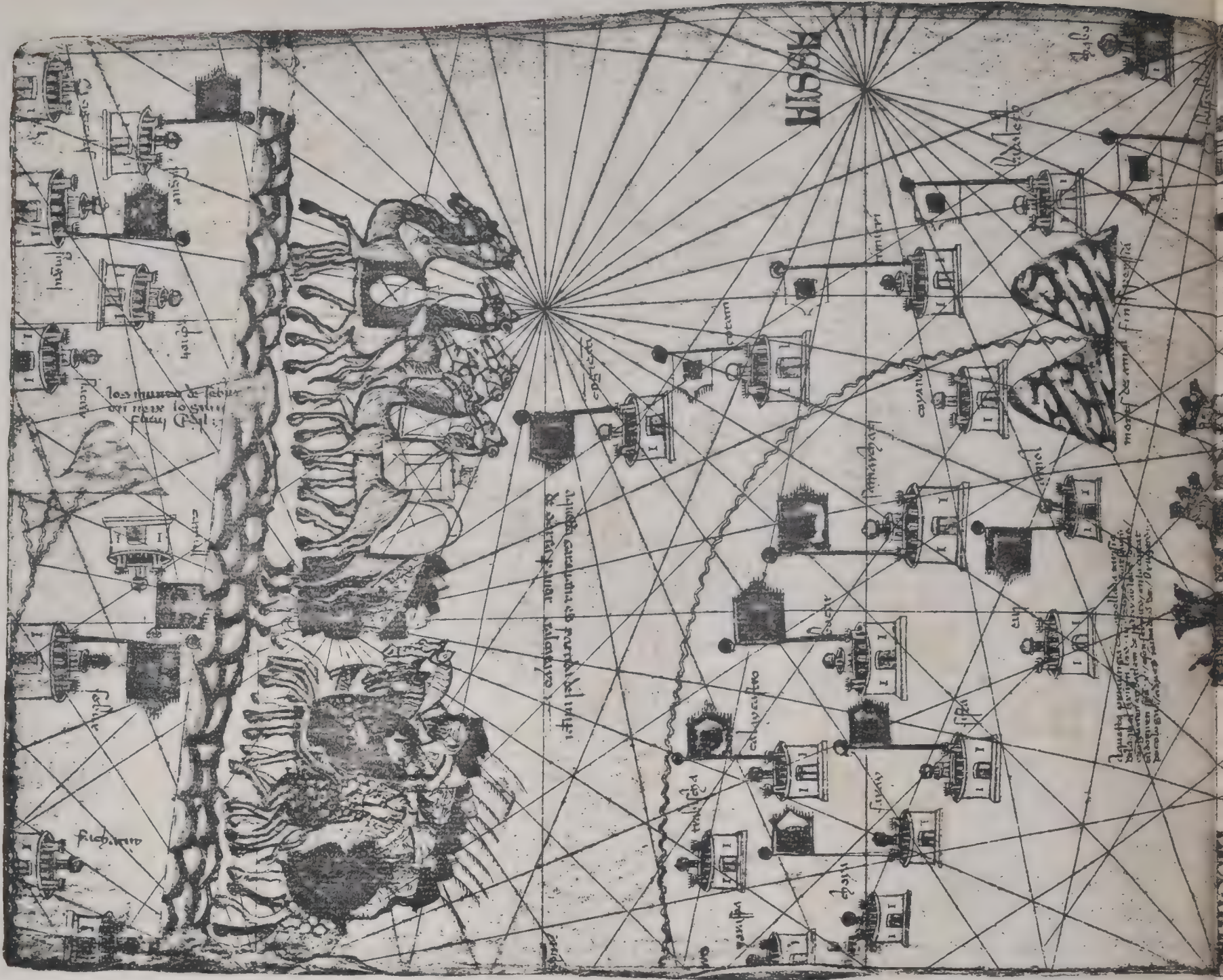
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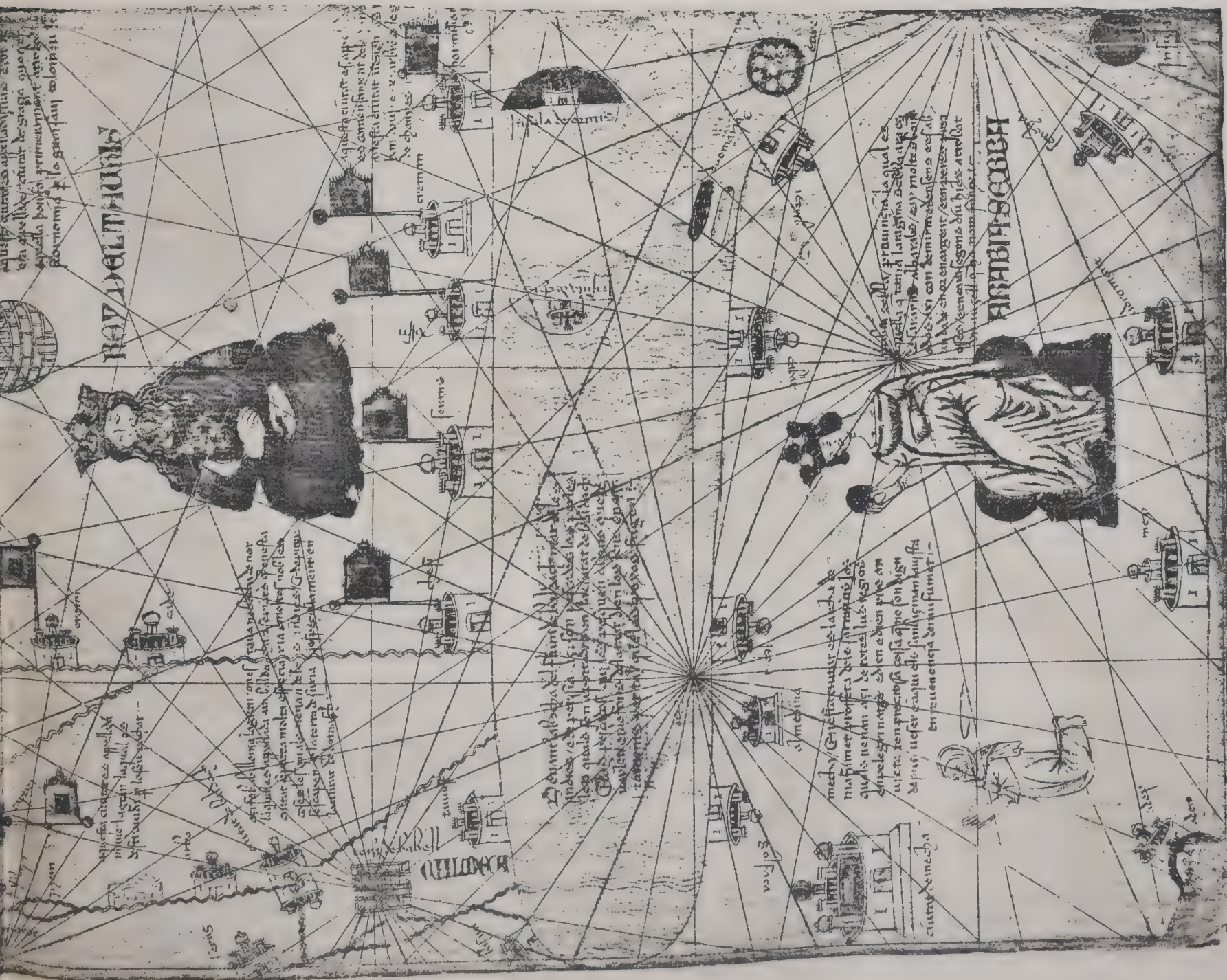
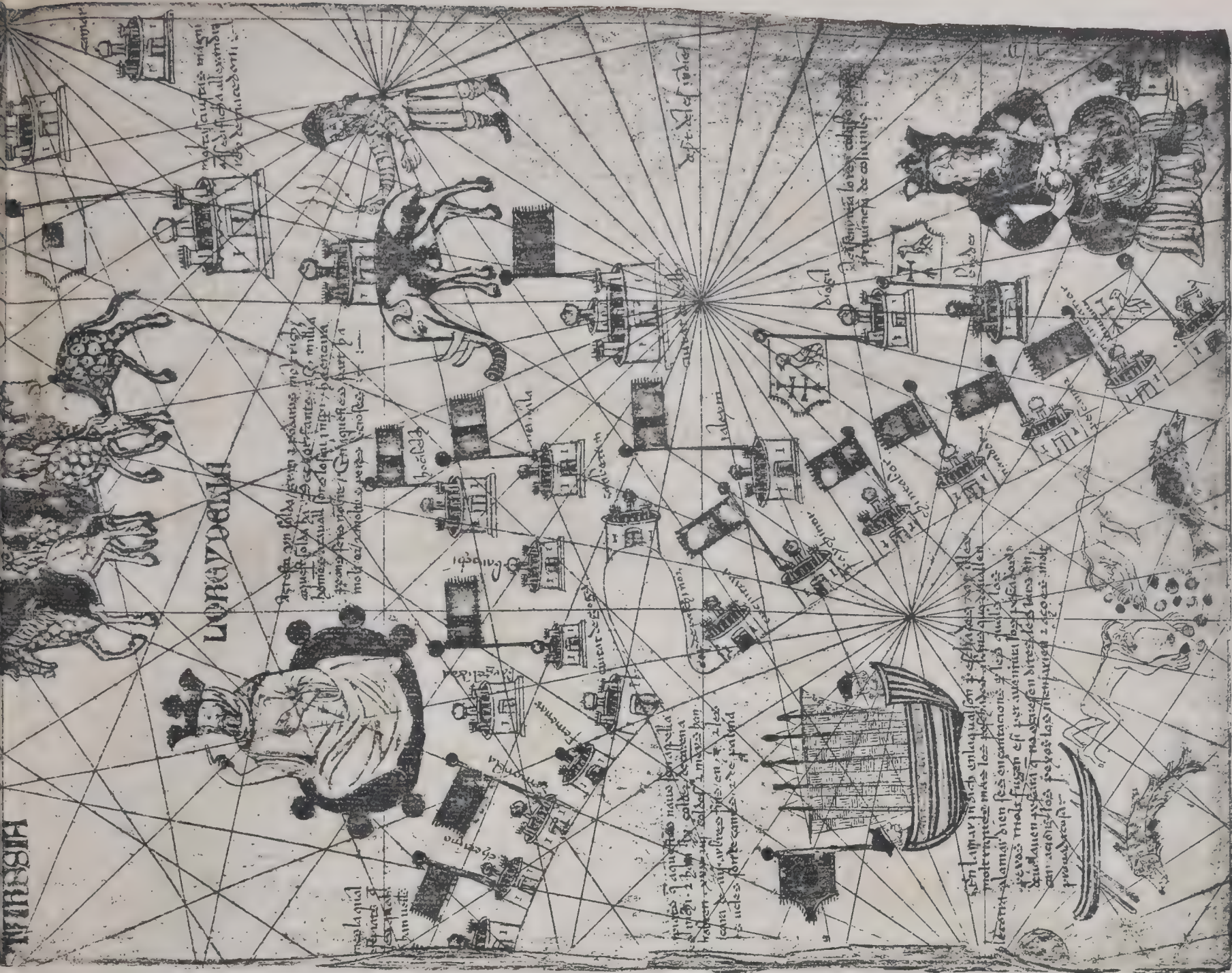


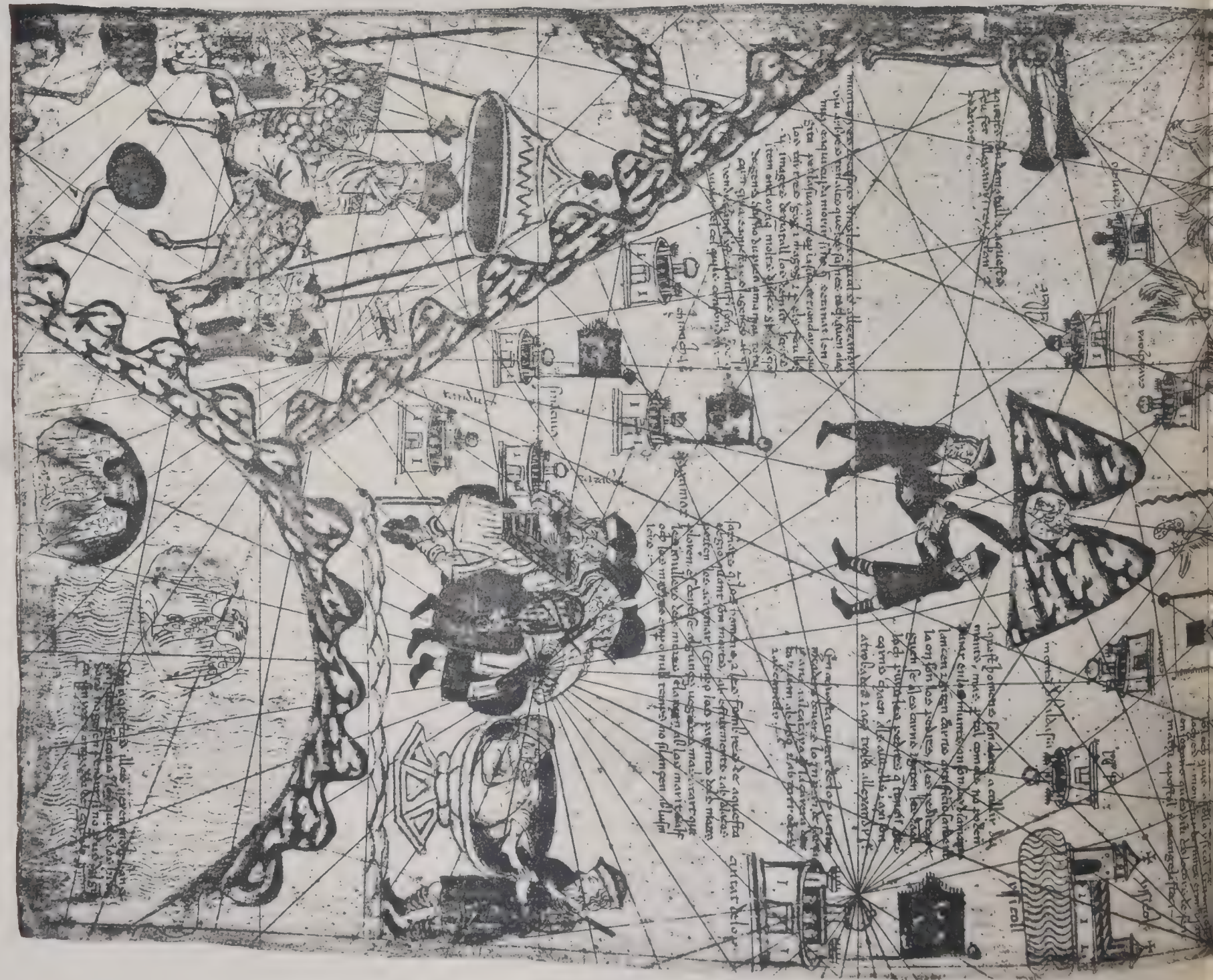


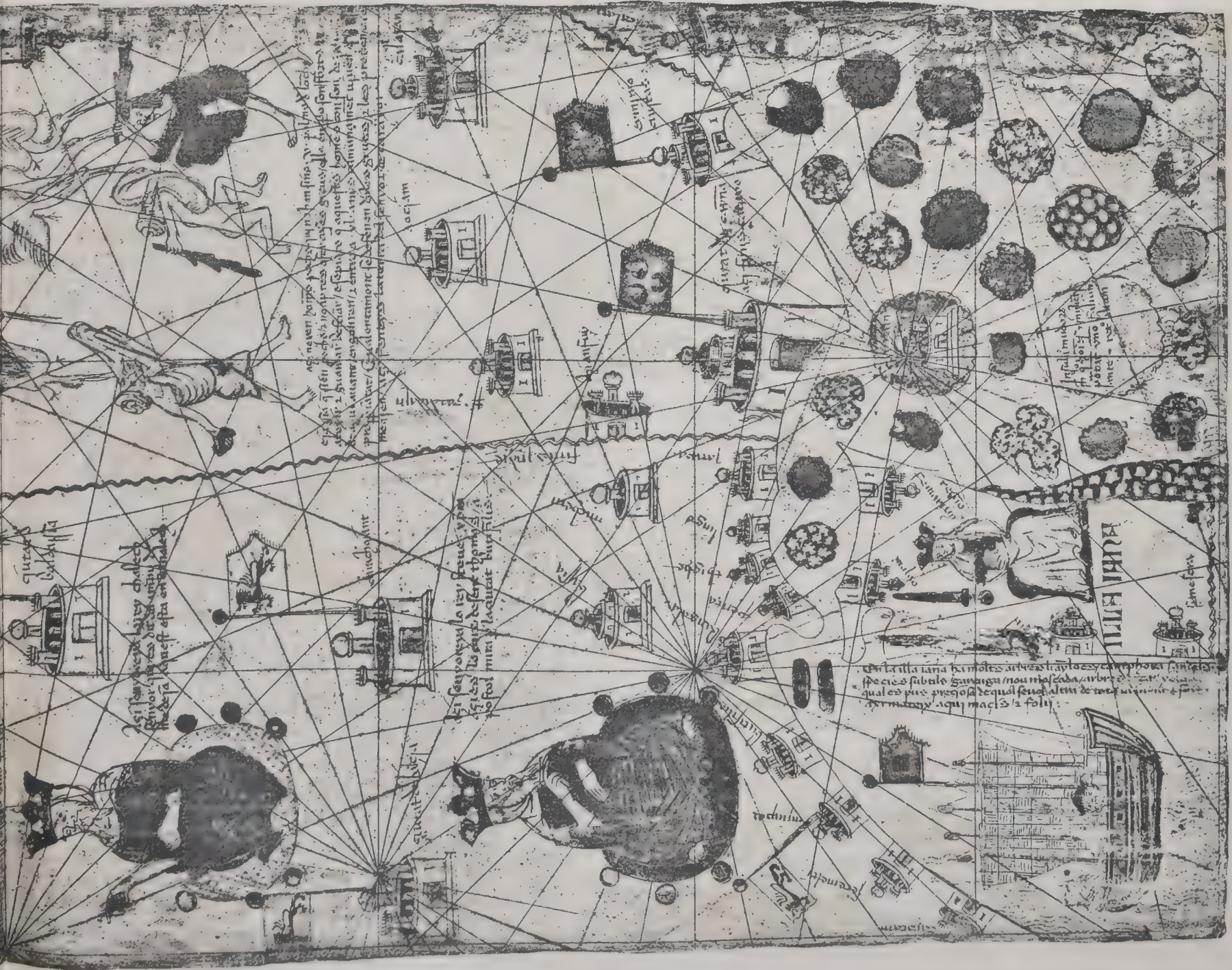
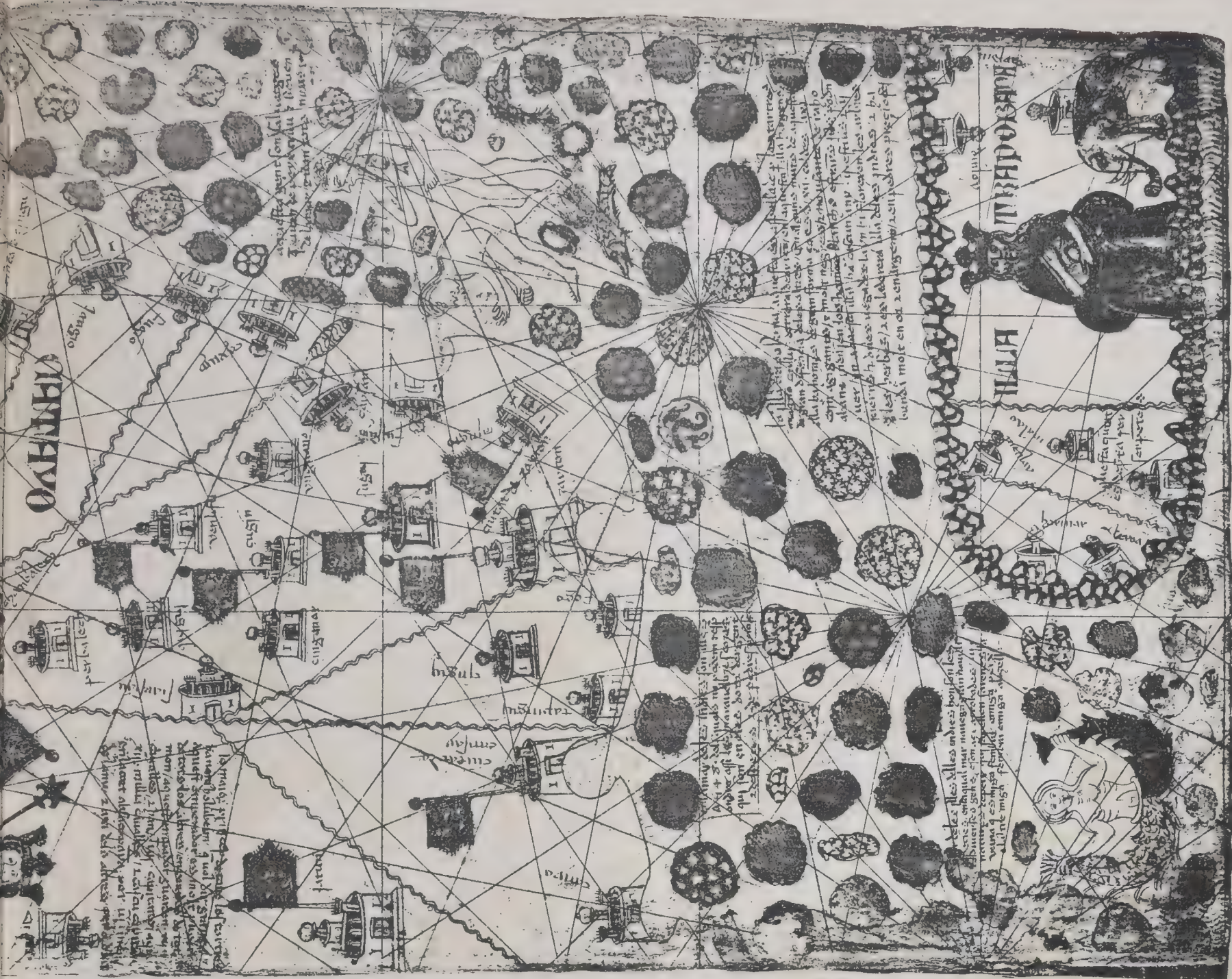


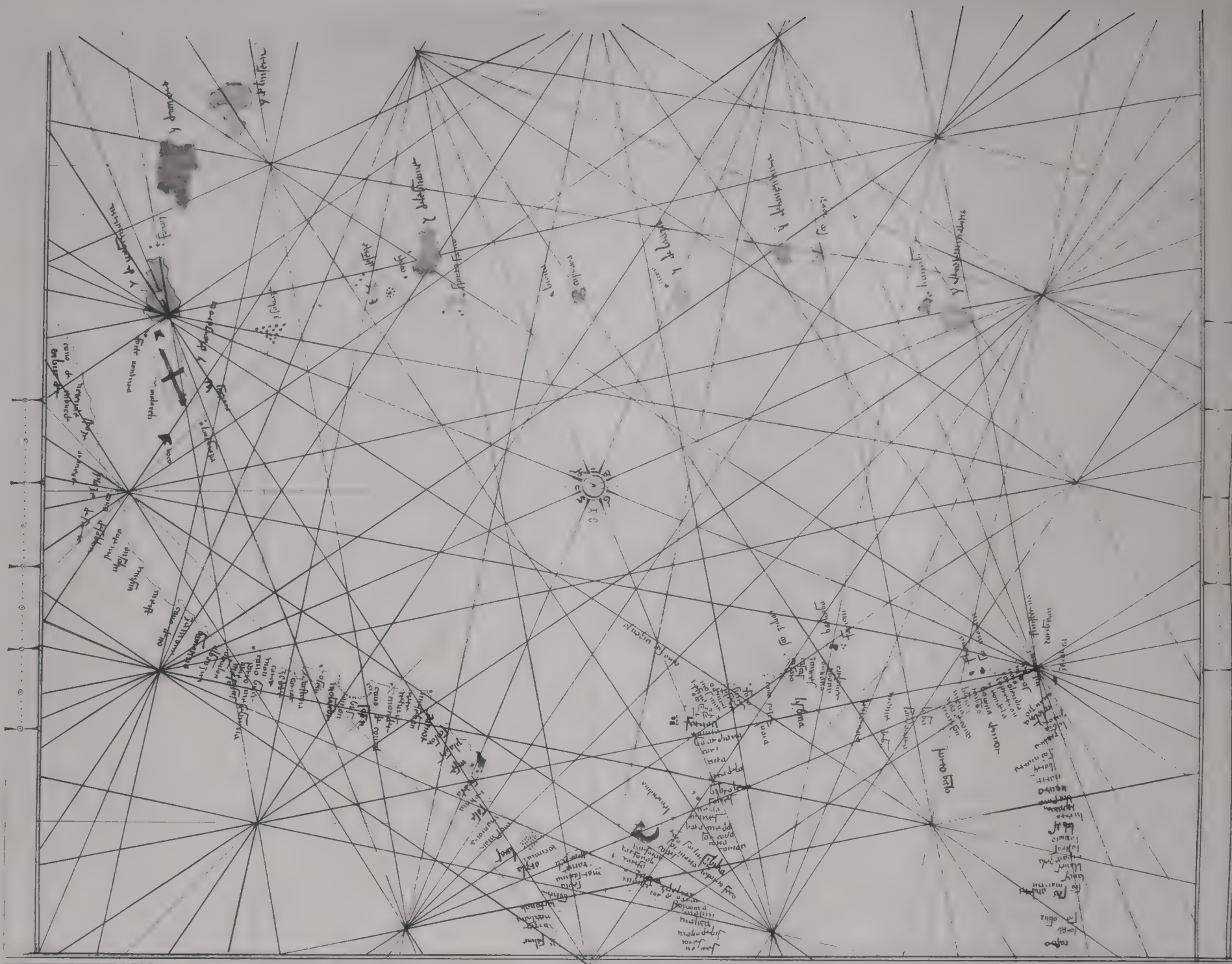


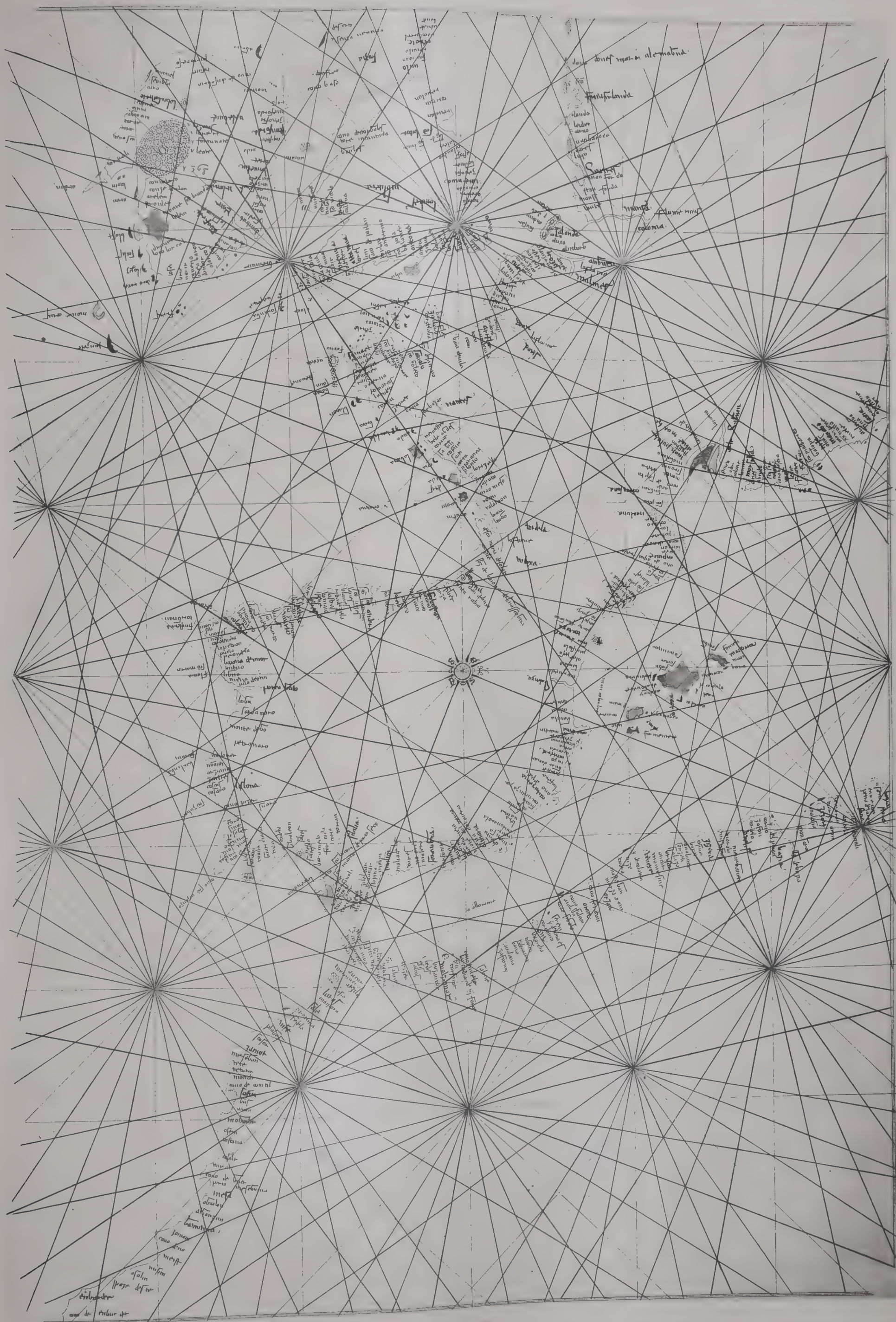


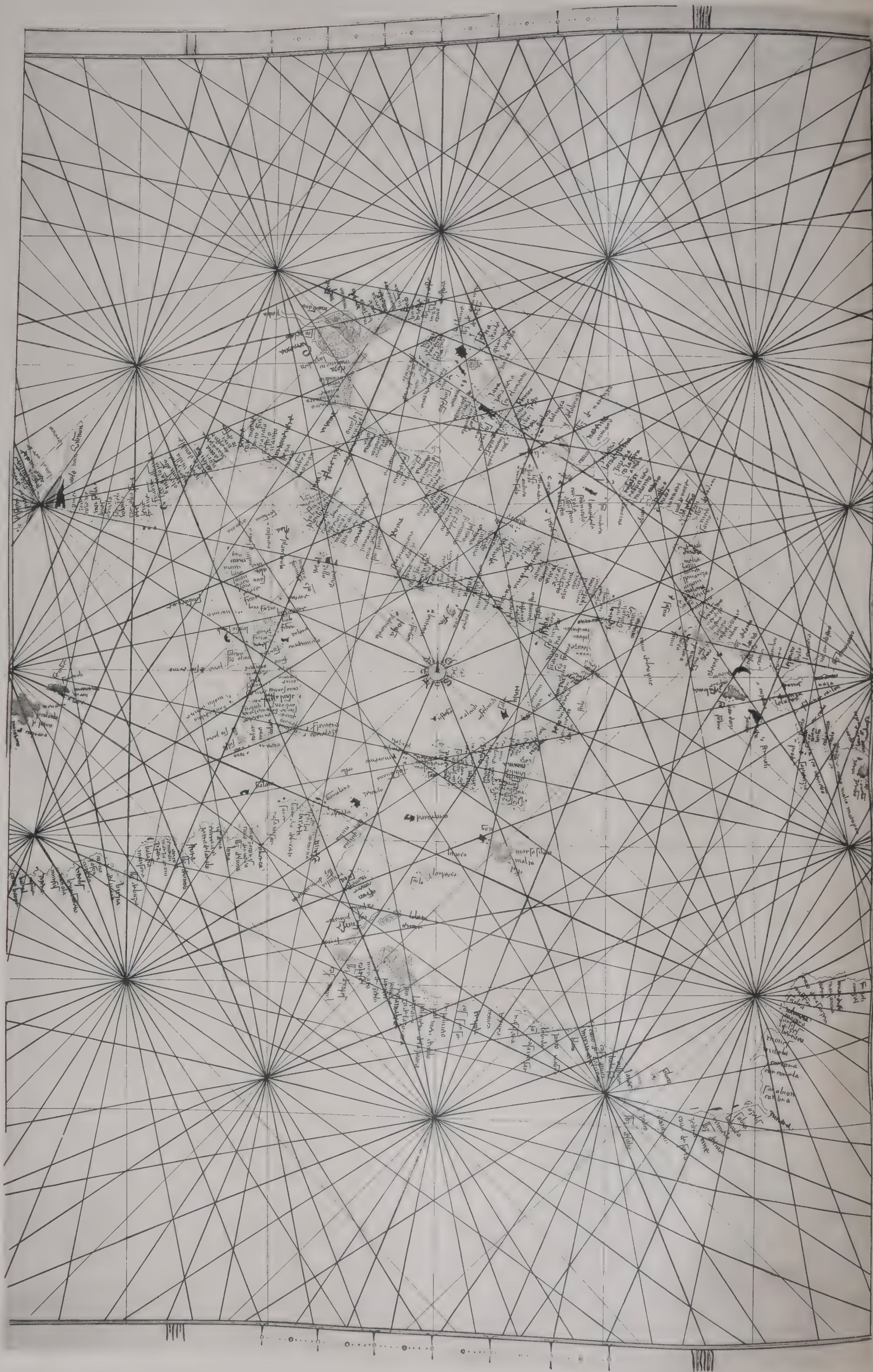


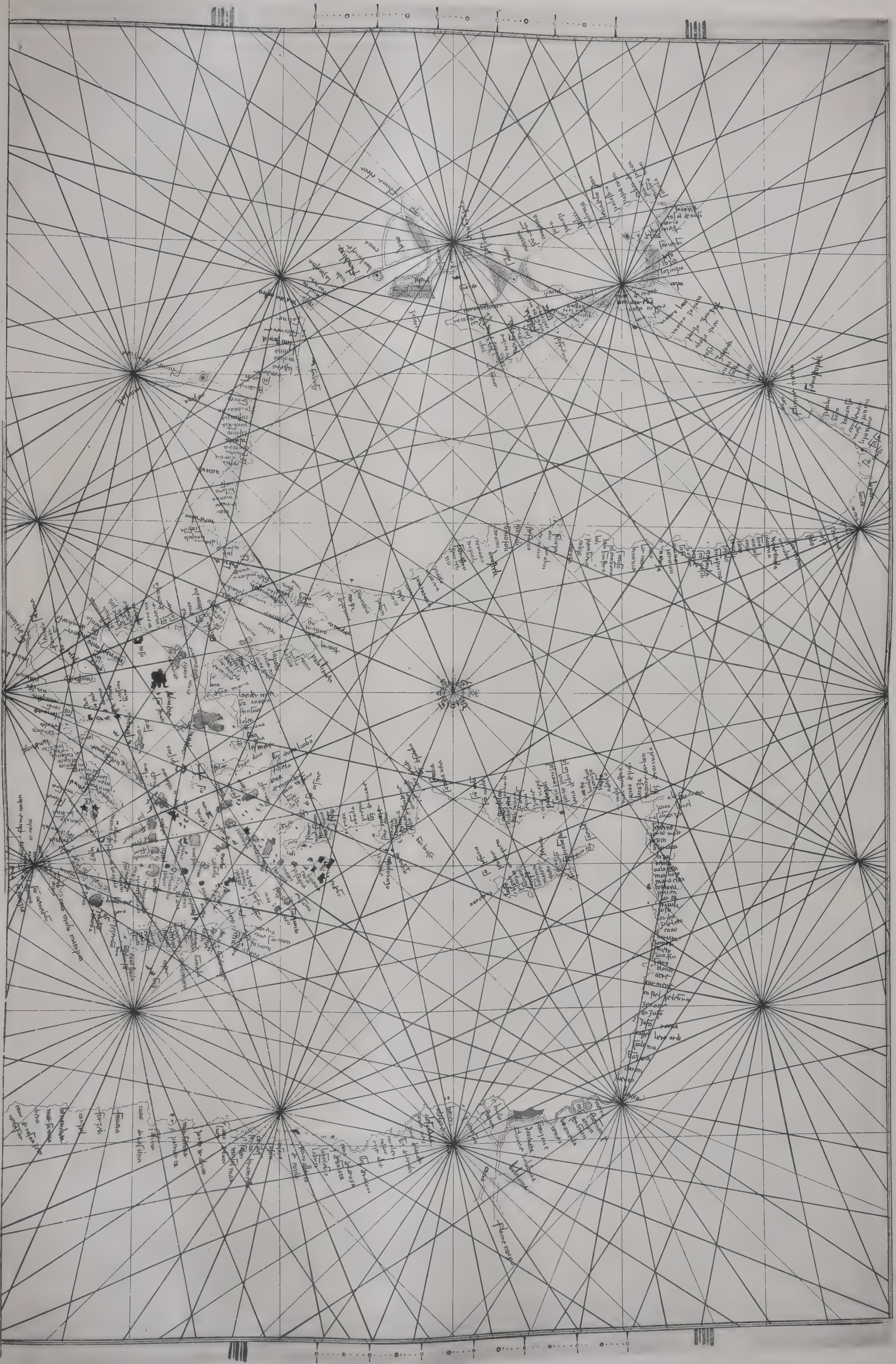


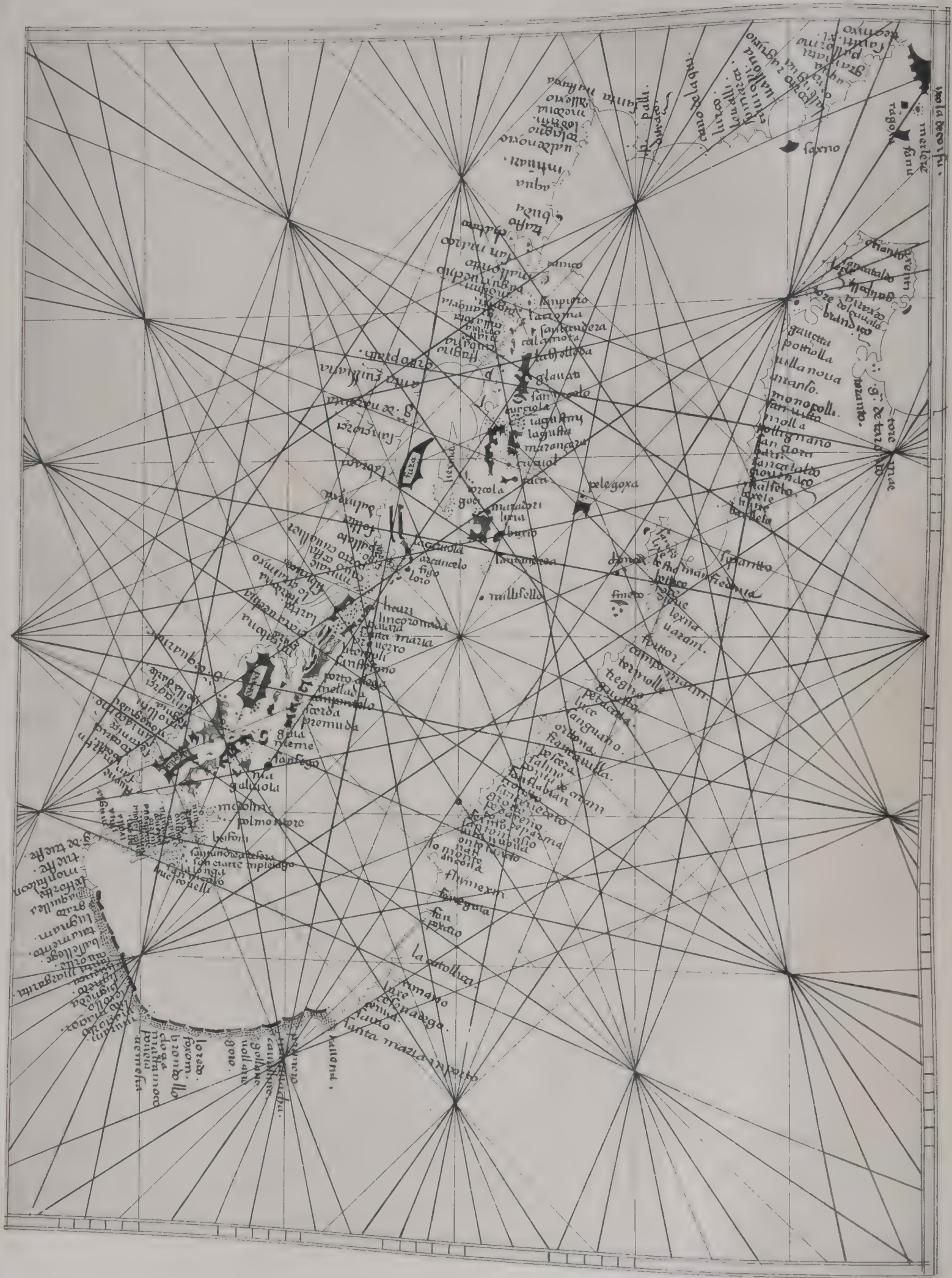


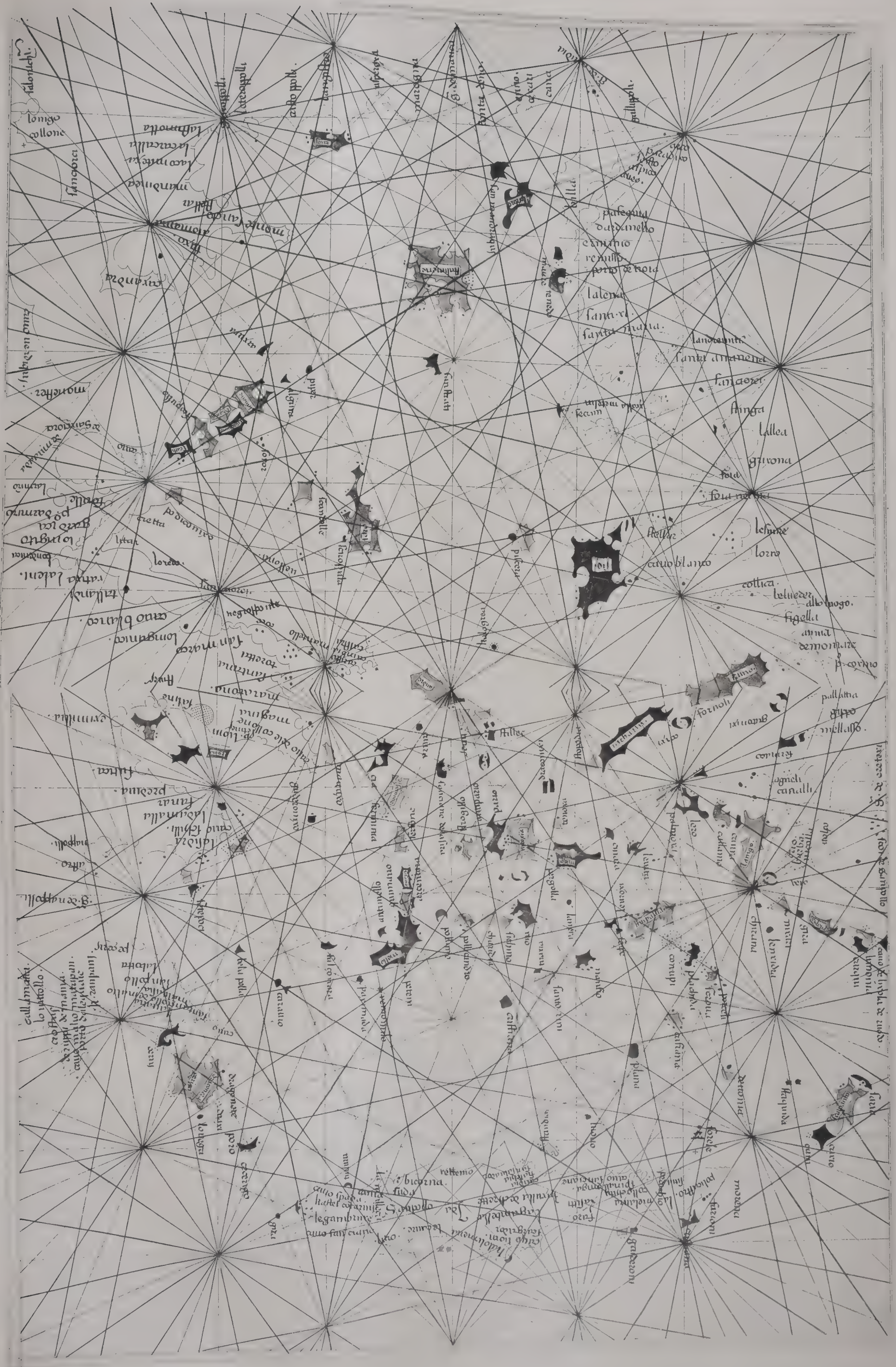
[illegible]





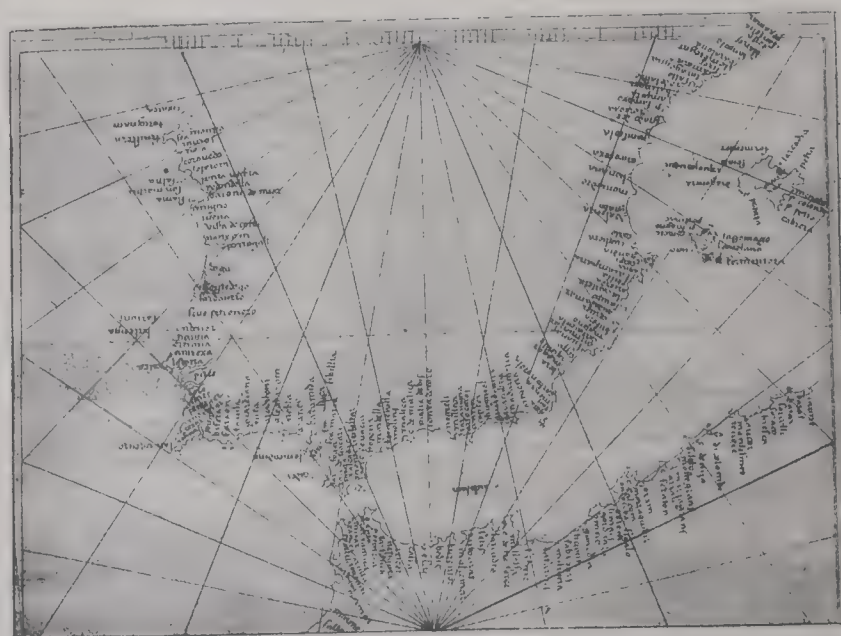
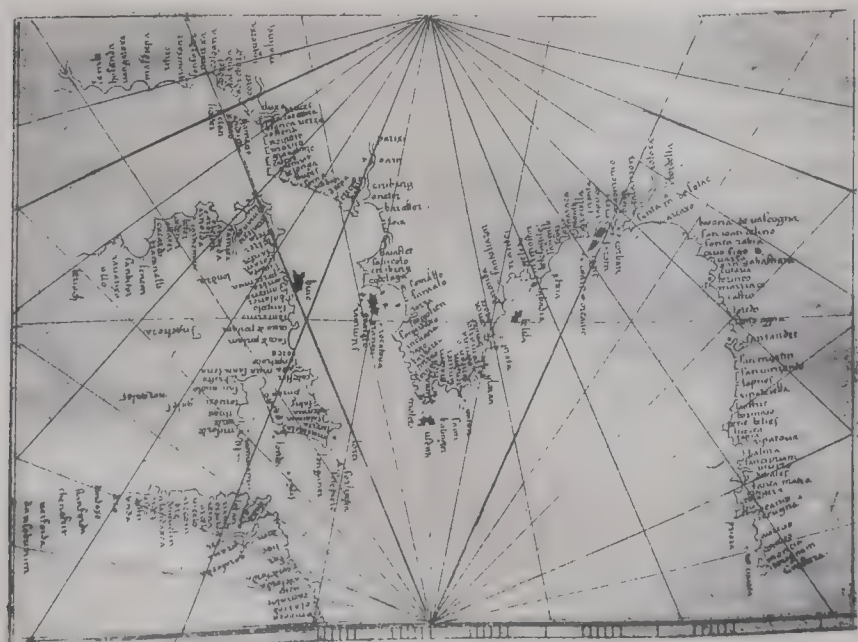
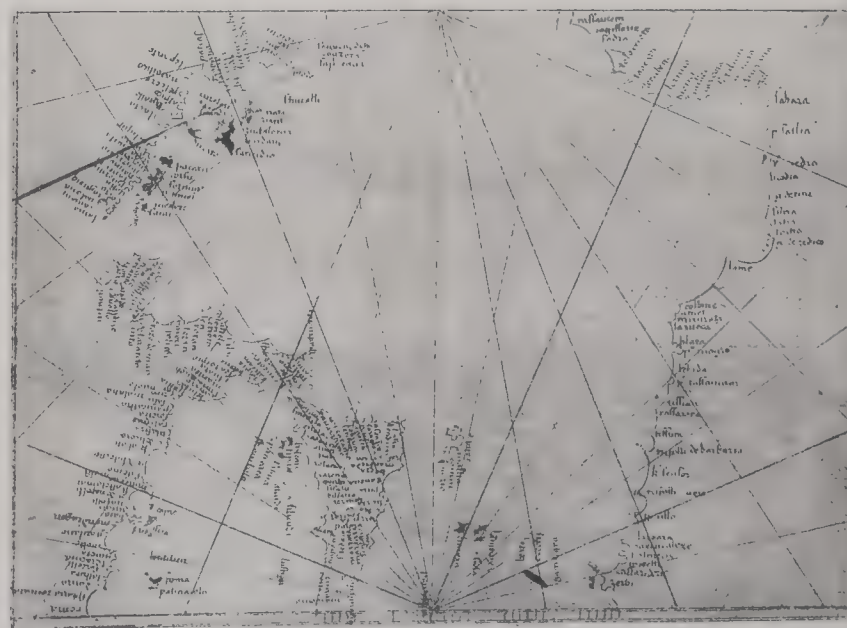
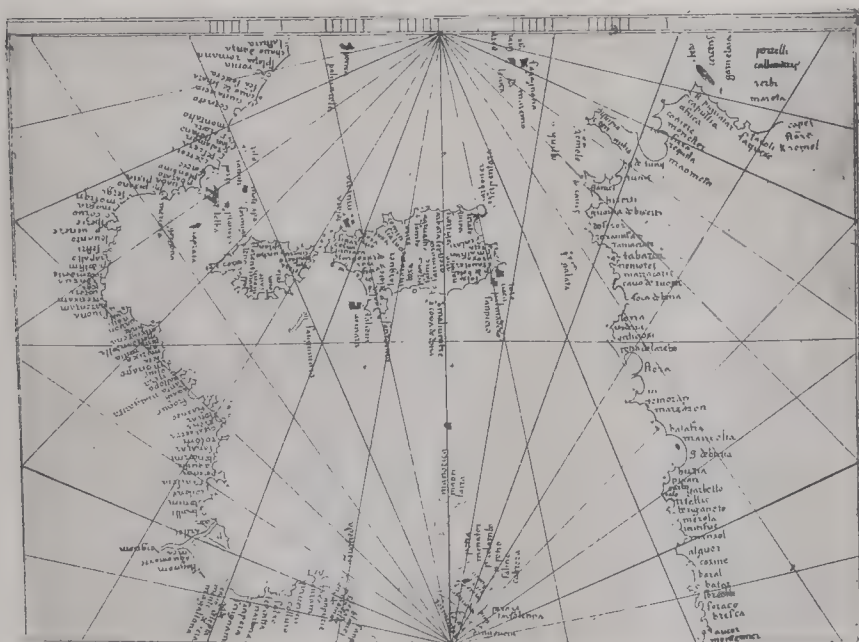
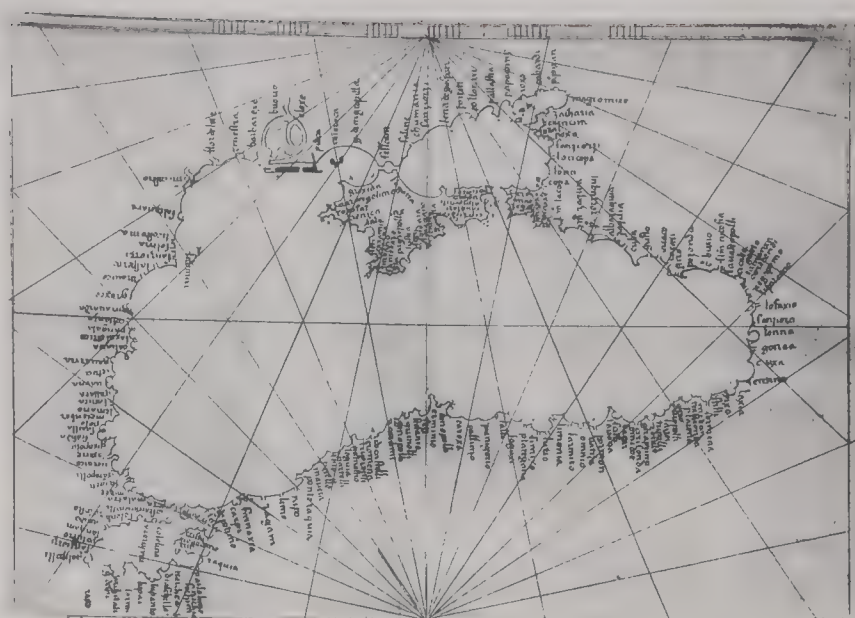
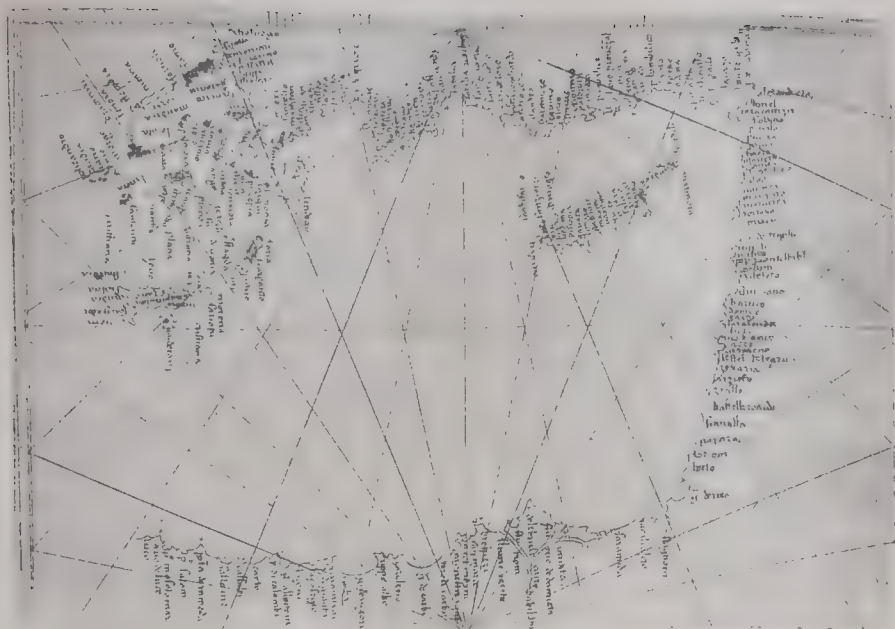








GUGLIELMO SOLERI 1385.



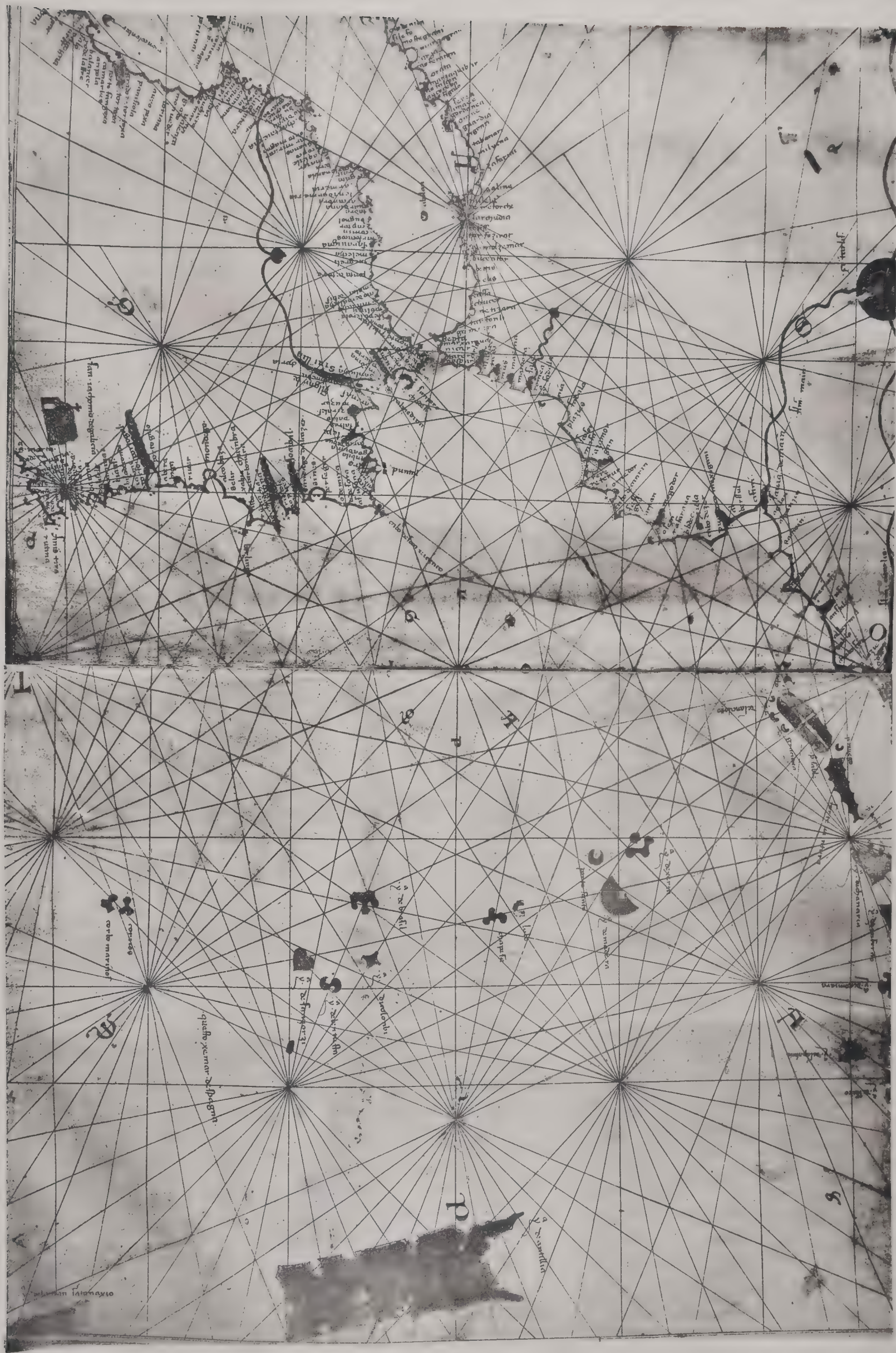
CHARTA NAVIGATORIA AUCTORIS INCERTI SEculi XIV
(PORTOL. LUXORO)



CHARTA NAVIGATORIA AUCTORIS INCERTI SECU









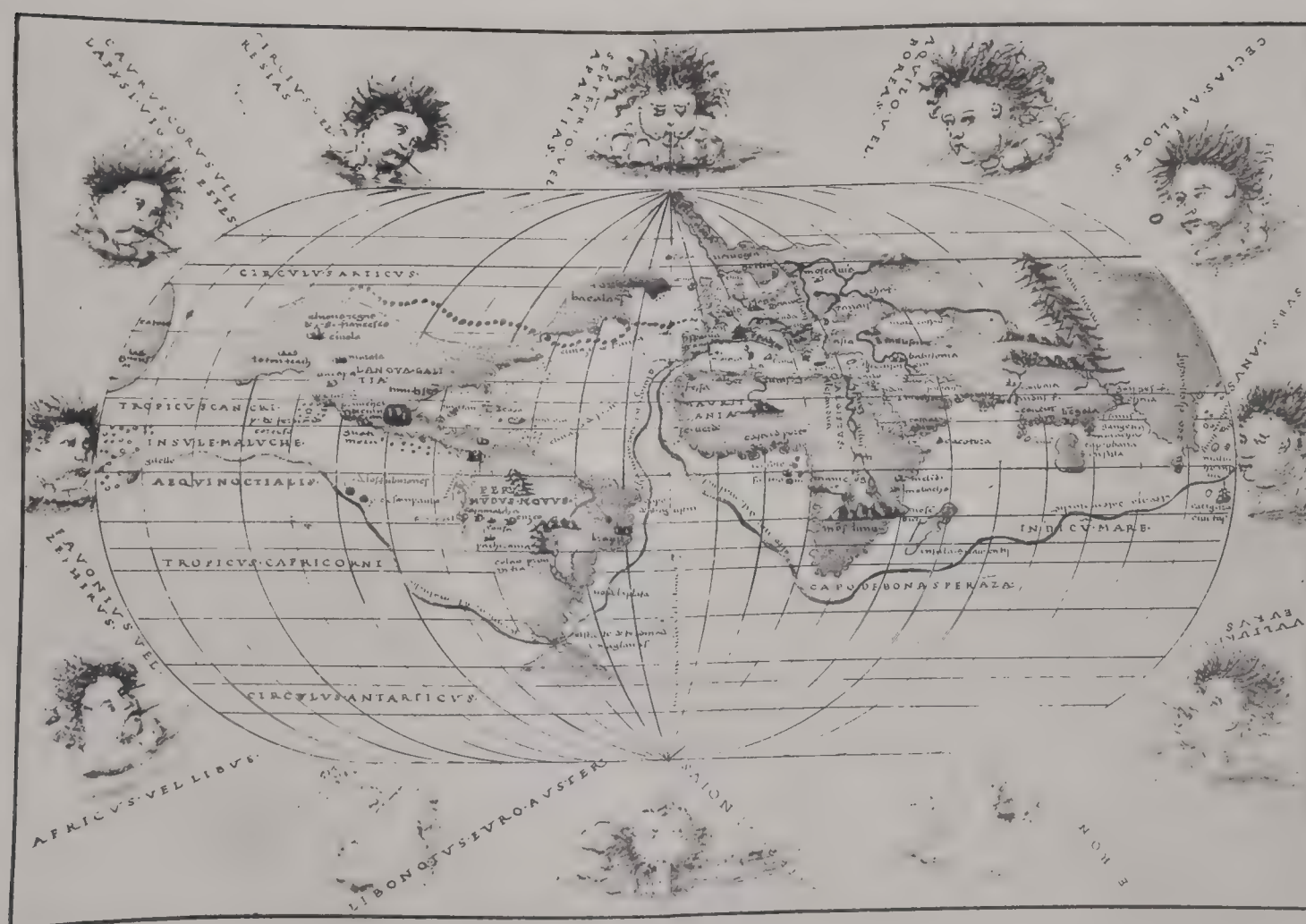




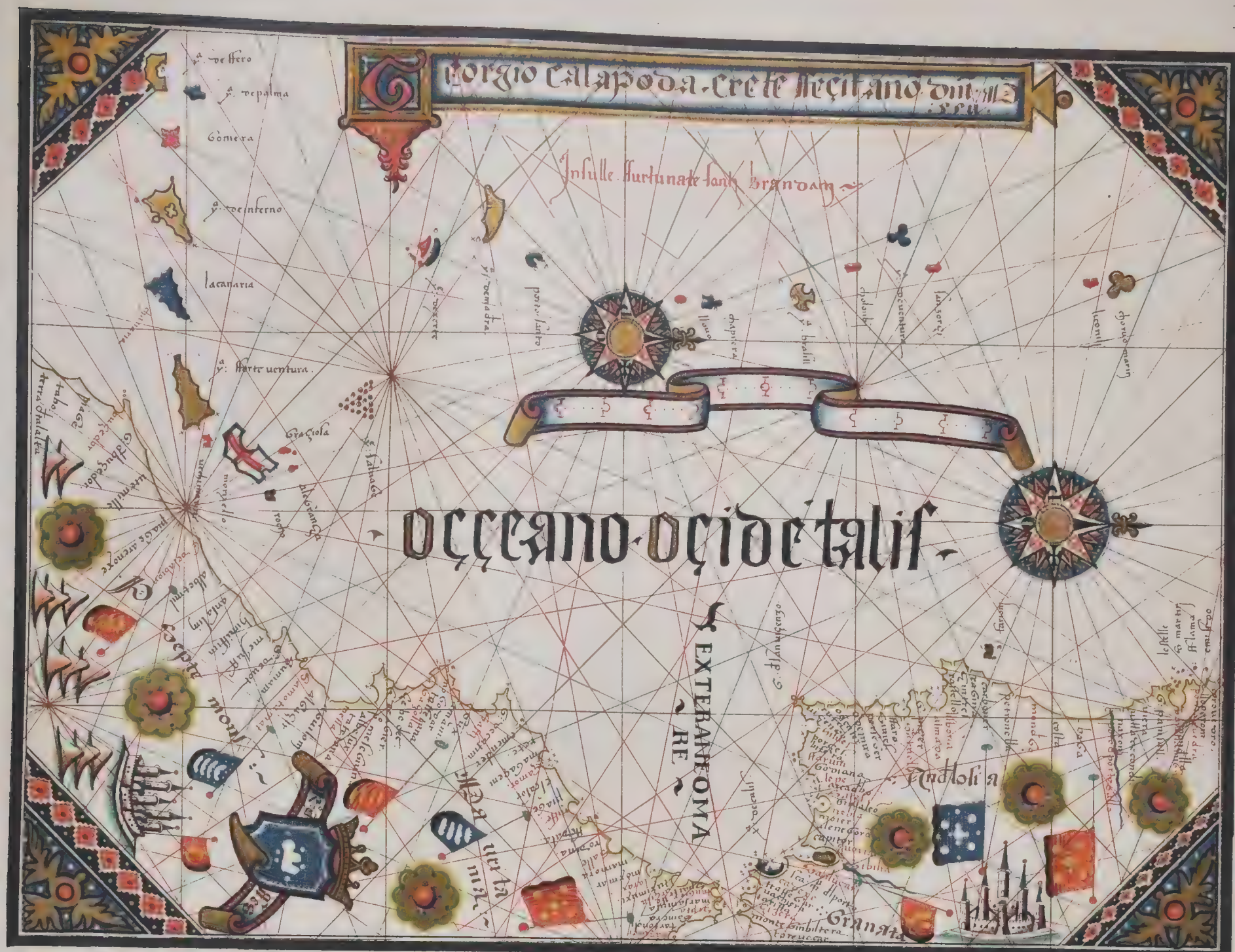


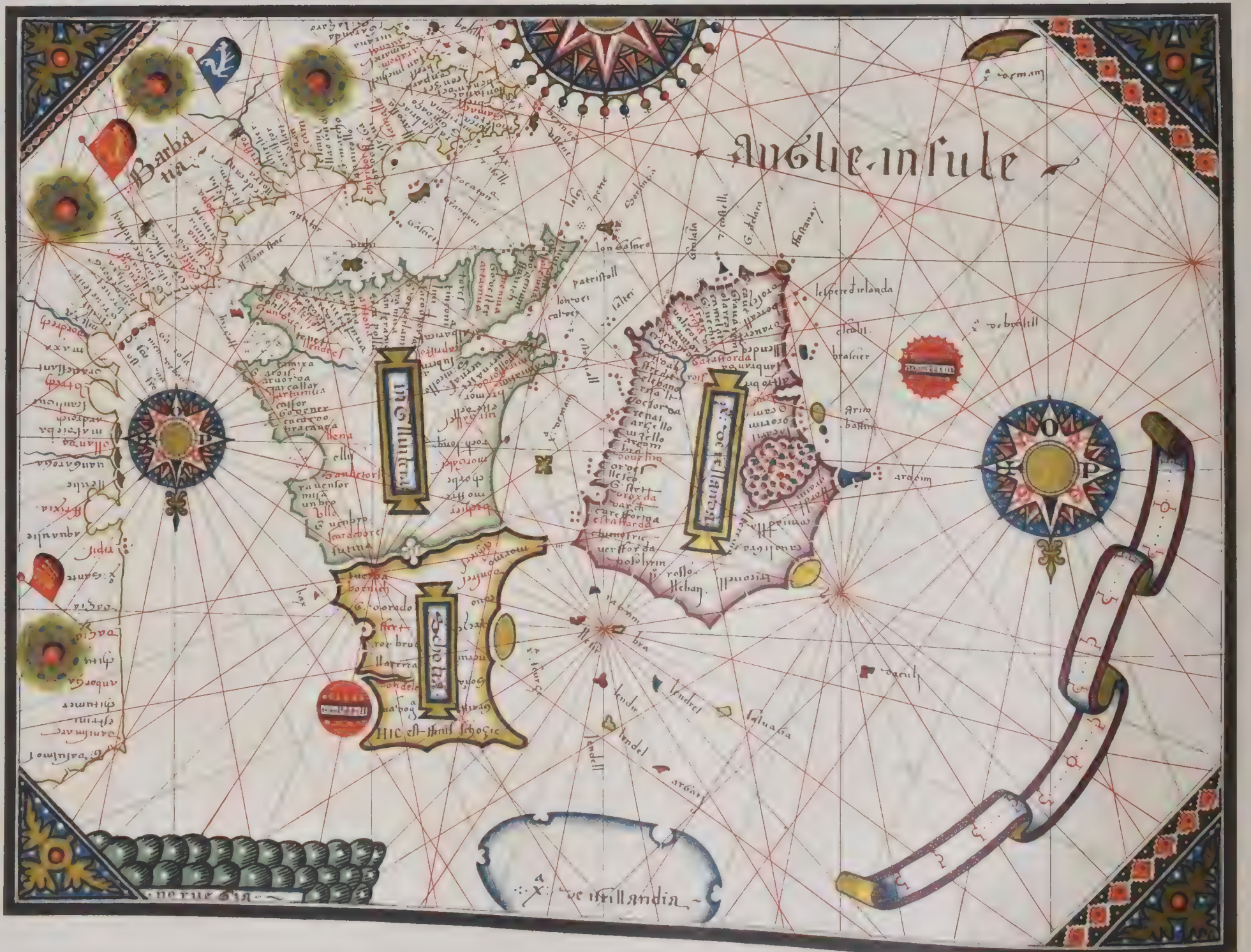
CHARTA NAVIGATORIA AUCTORIS INCERTI CIRCA 1500







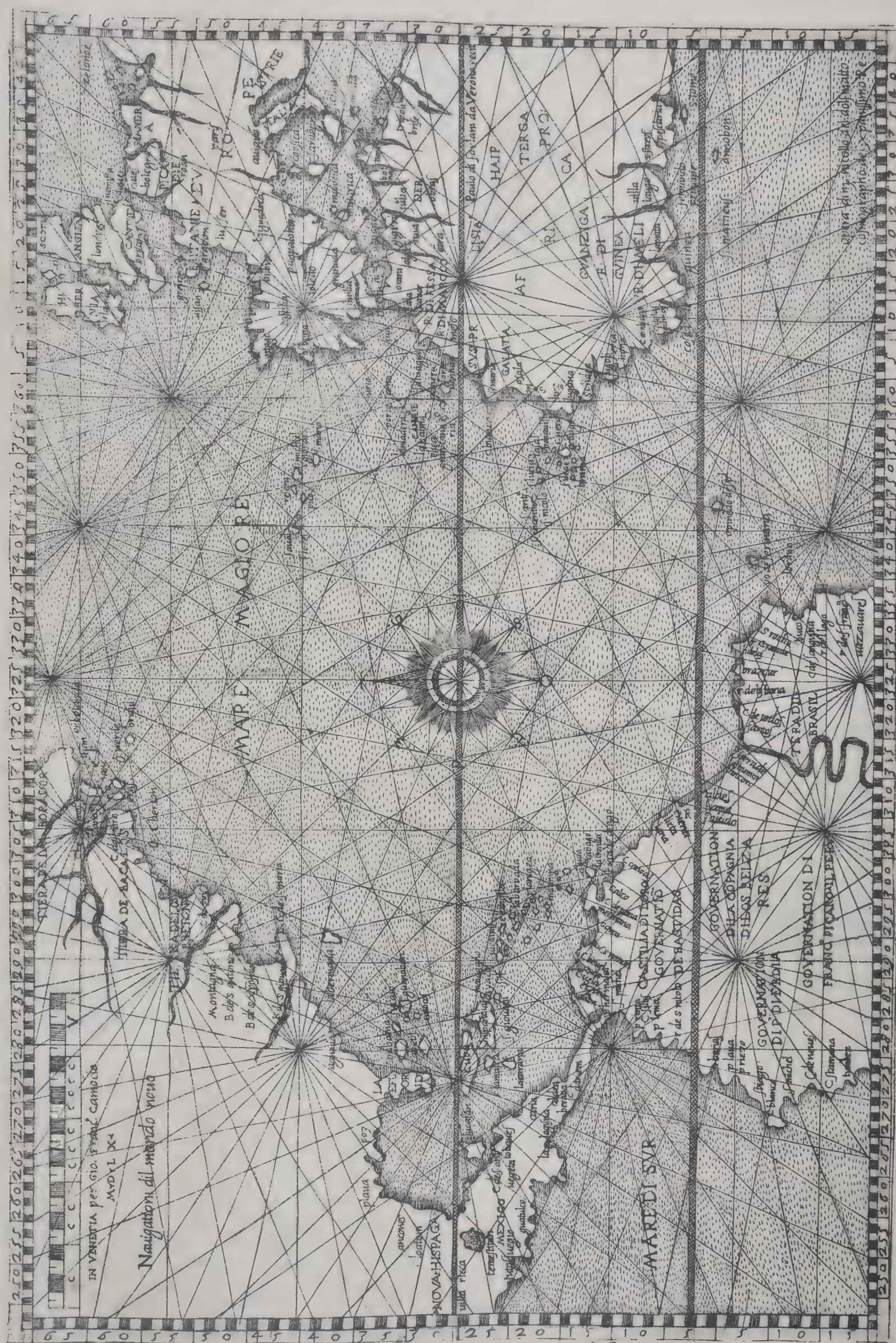








CHARTA NAVIGATORIA MARIS ADRIATICI ET AEGAEI, IN LIGNUM INCISA.
 VENETIIS c. 1550.



NICOLAUS DE NICOLAY, CHARTA NAVIGATORIA MARIS ATLANTICI, IN AES INCISA.
VENETIIS 1560.





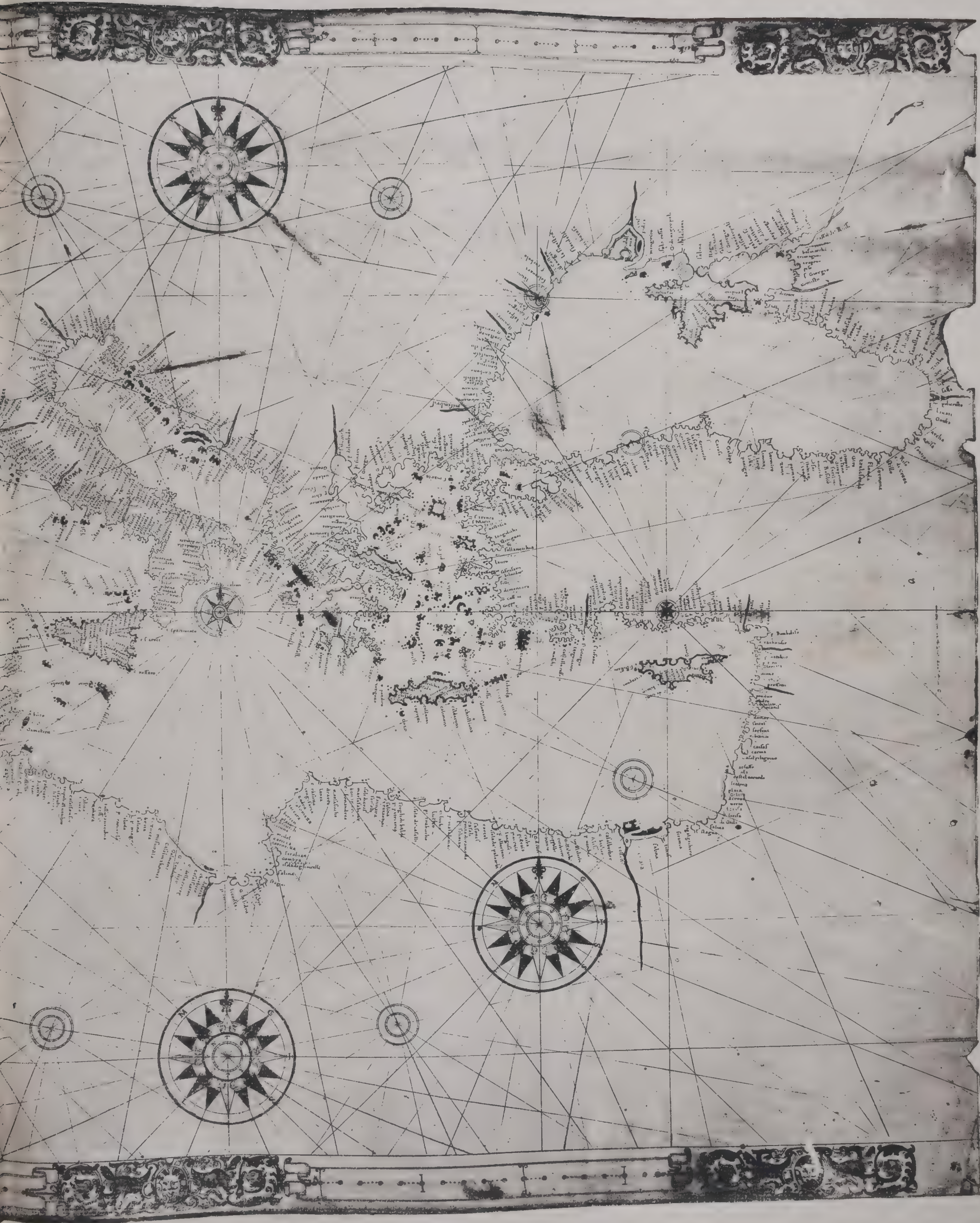








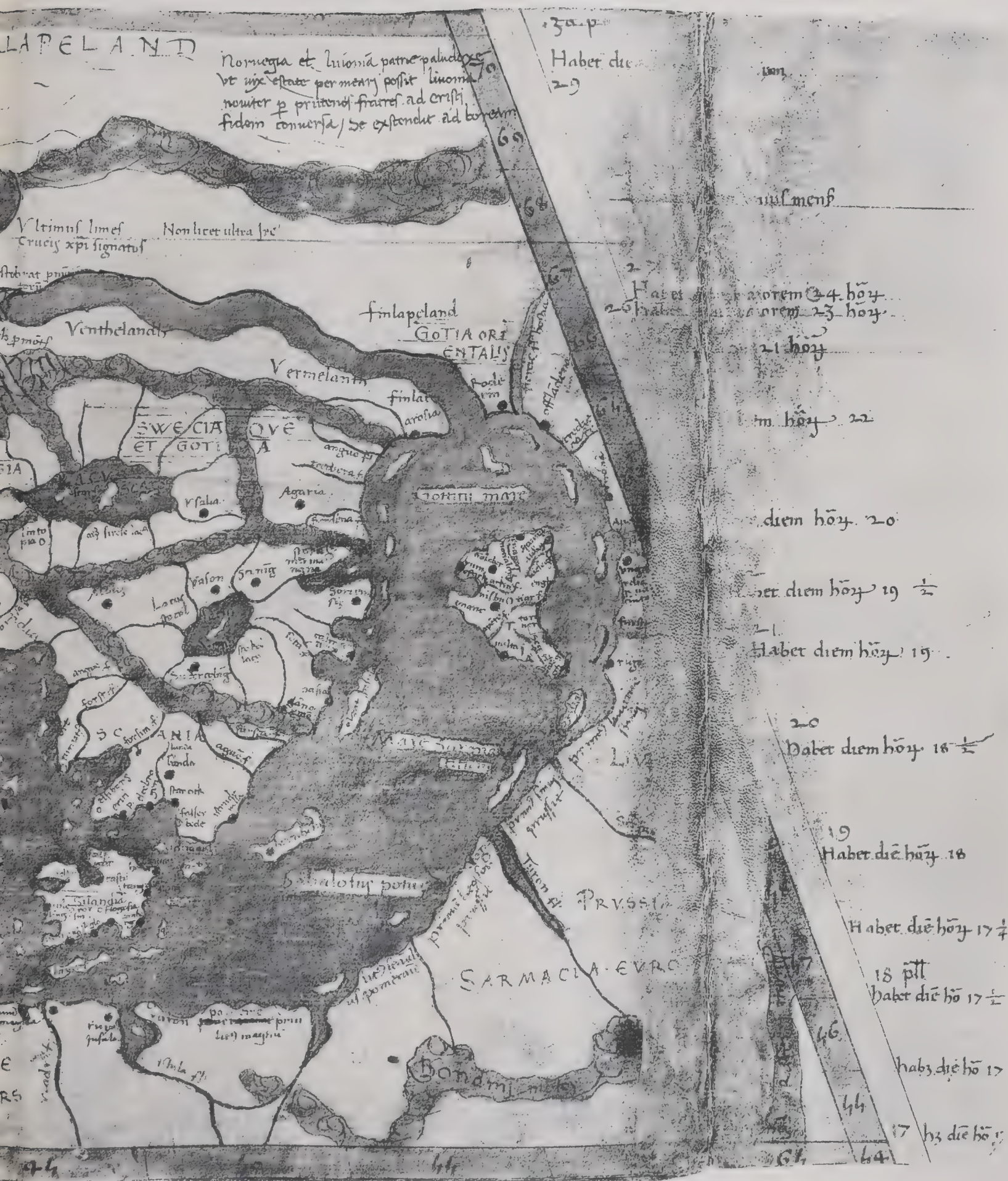




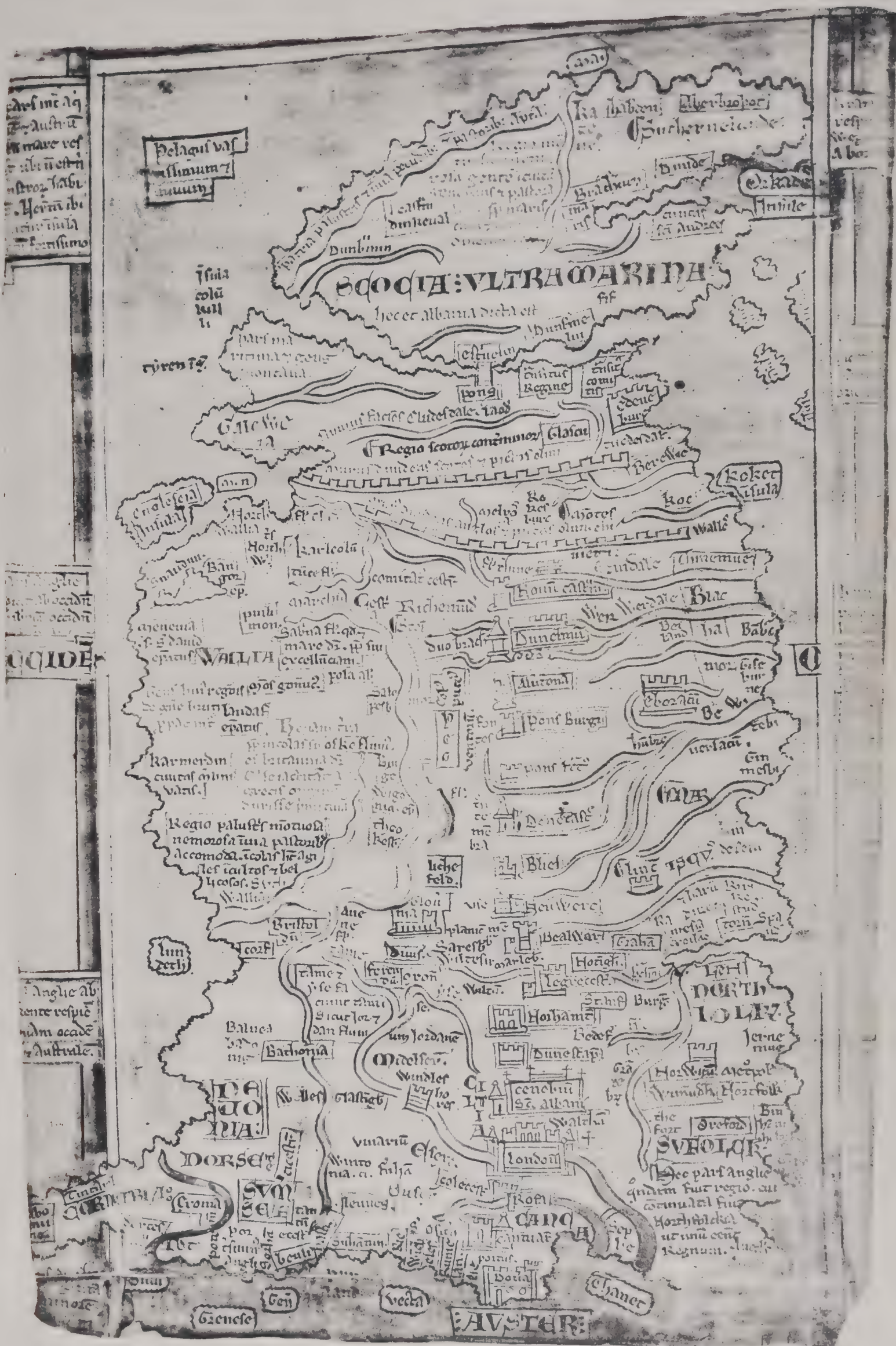
CRESCENTIUS) 1596.



TABULA REGIONUM
E CODICE CHRIST. ENSENI (BUONDELMONTE) SEculi XV.



SEPTENTRIONALIUM
IN BIBLIOTHECA LAURENZIANA FLORENTIAE CONSERVATO.



MATTHAEUS PARISIENSIS SEC. XIII.



CHRIST. ENSENIUS (BUONDELMONTE) SEC. XV.

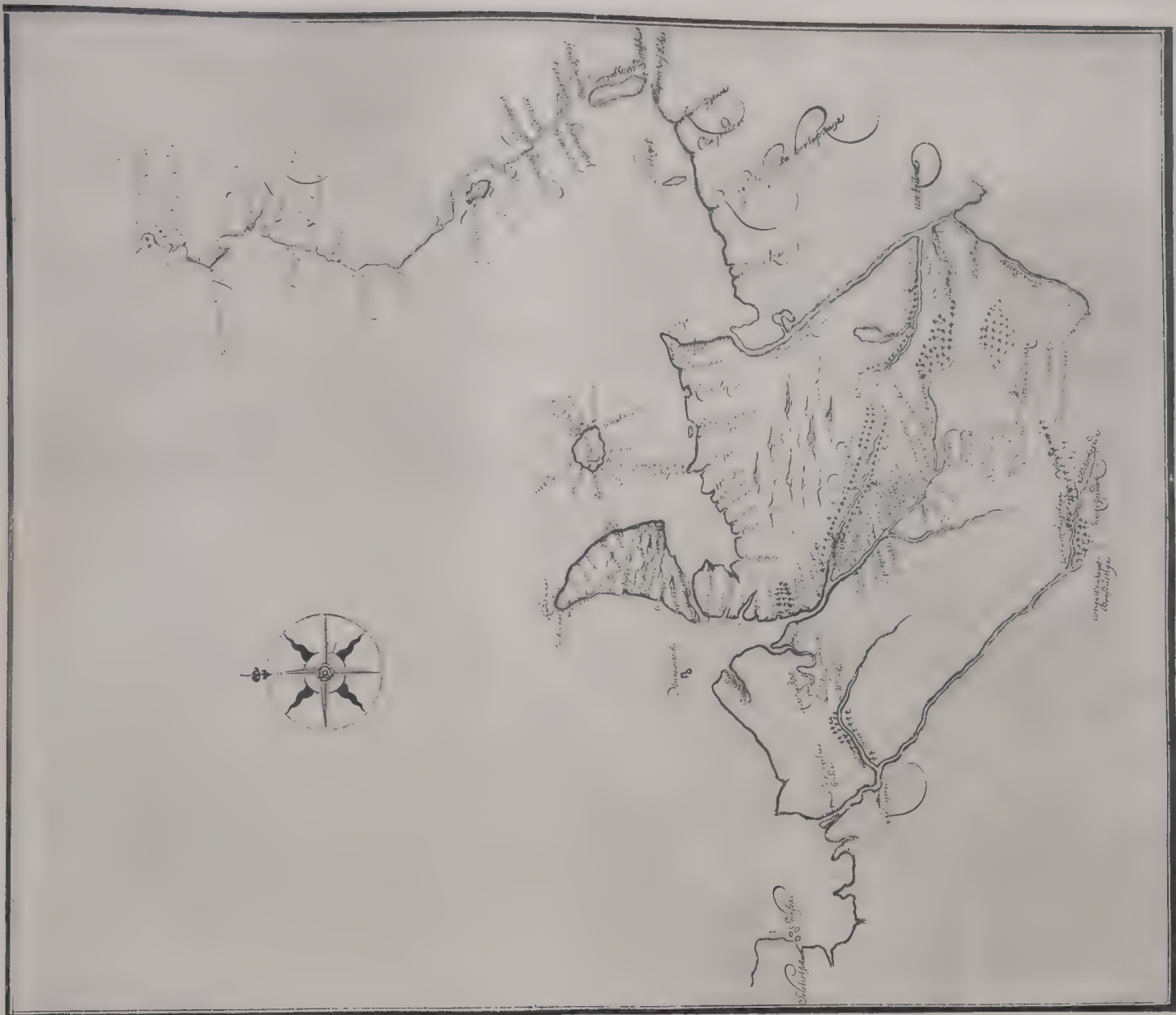


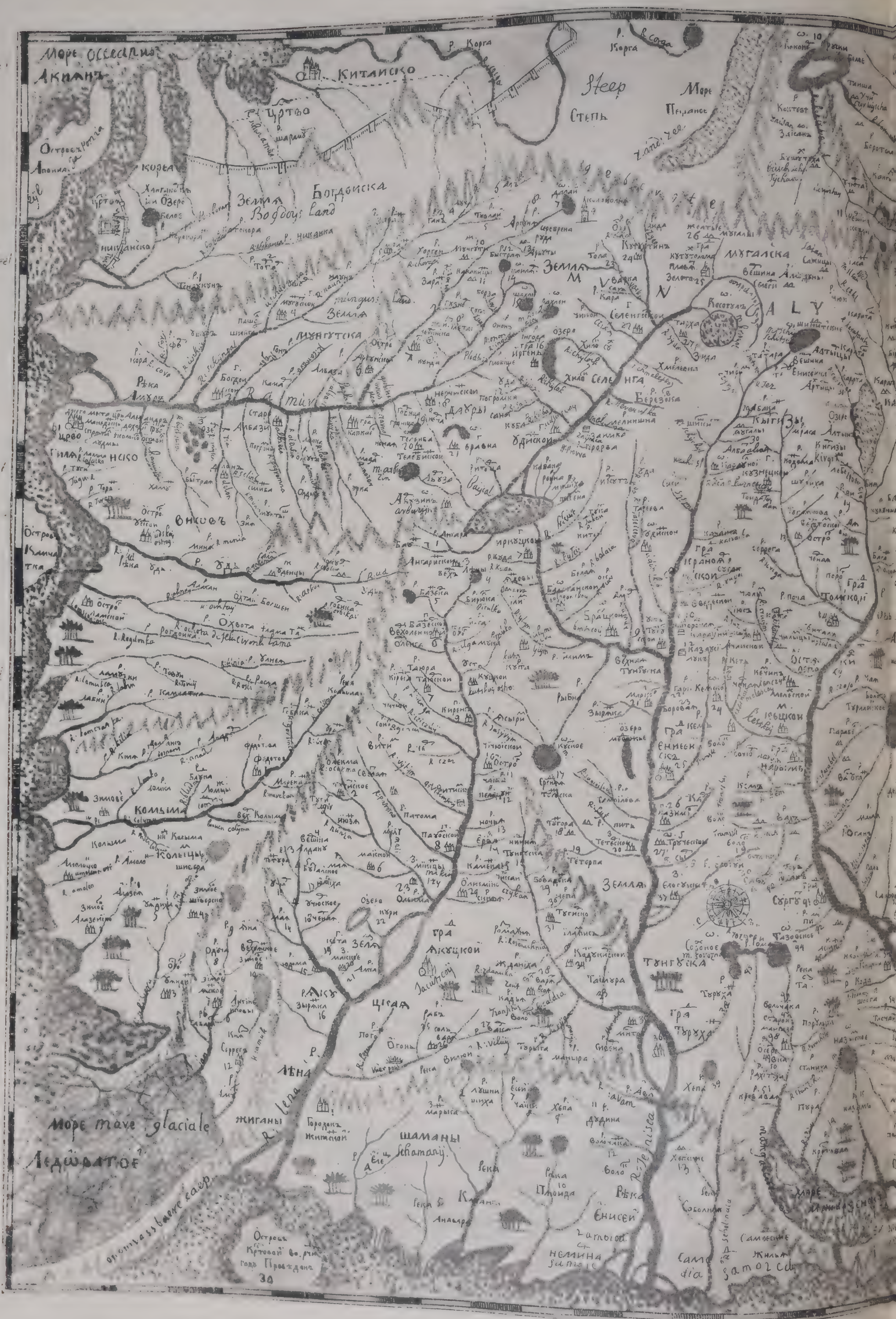
GRATIOSUS BENINCASA 1467.





ANTHONIUS WIED 1555 (1570).







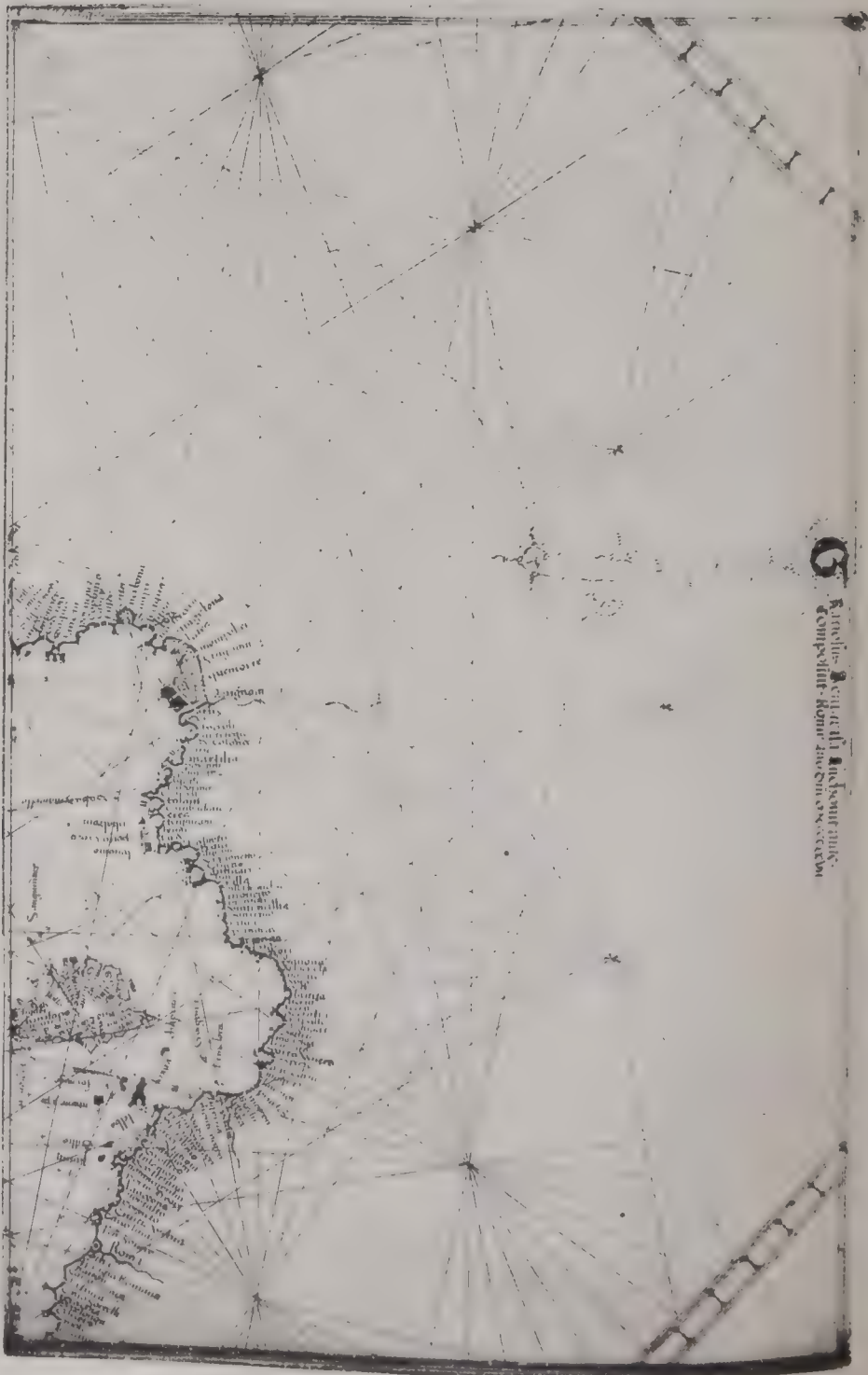
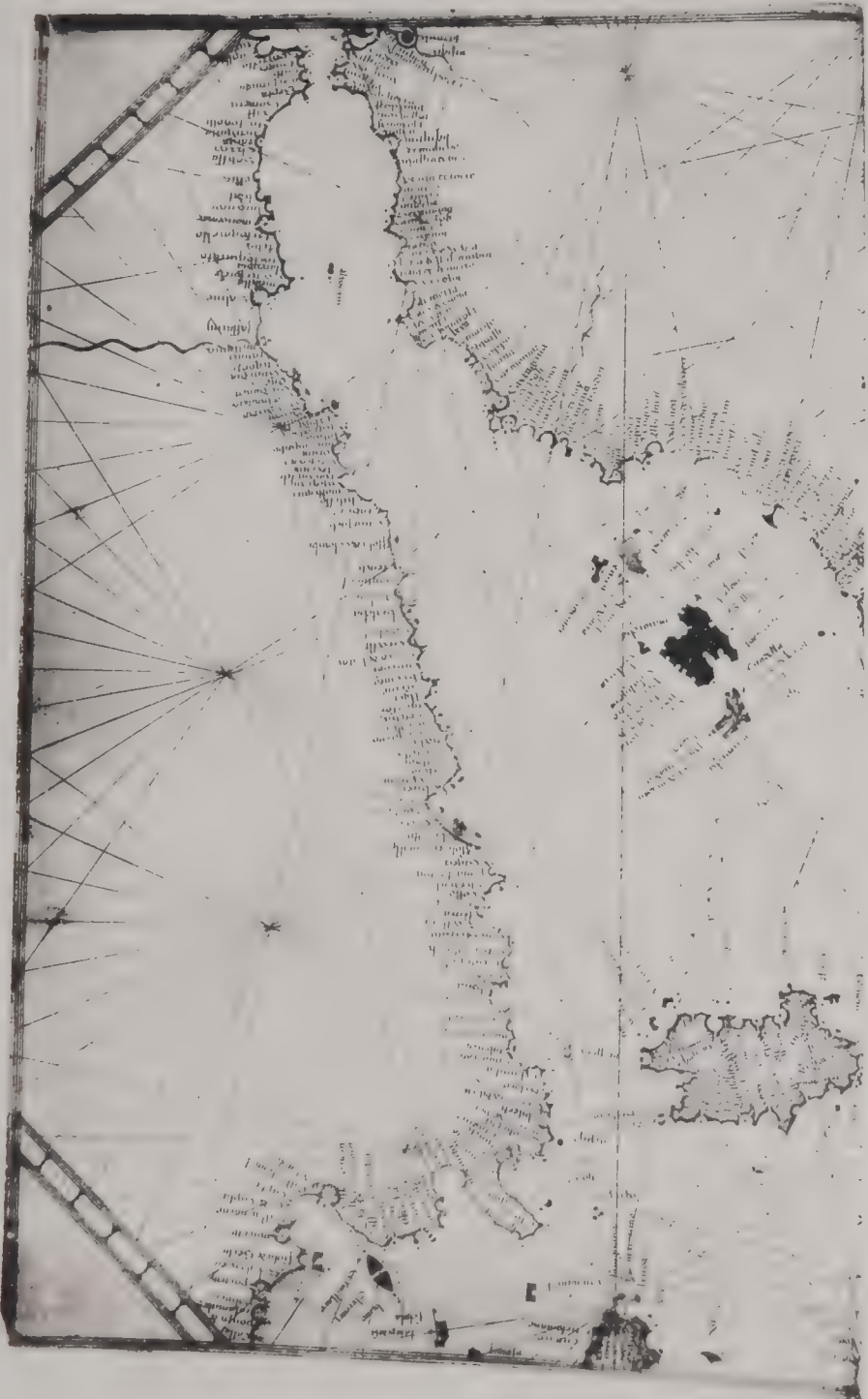
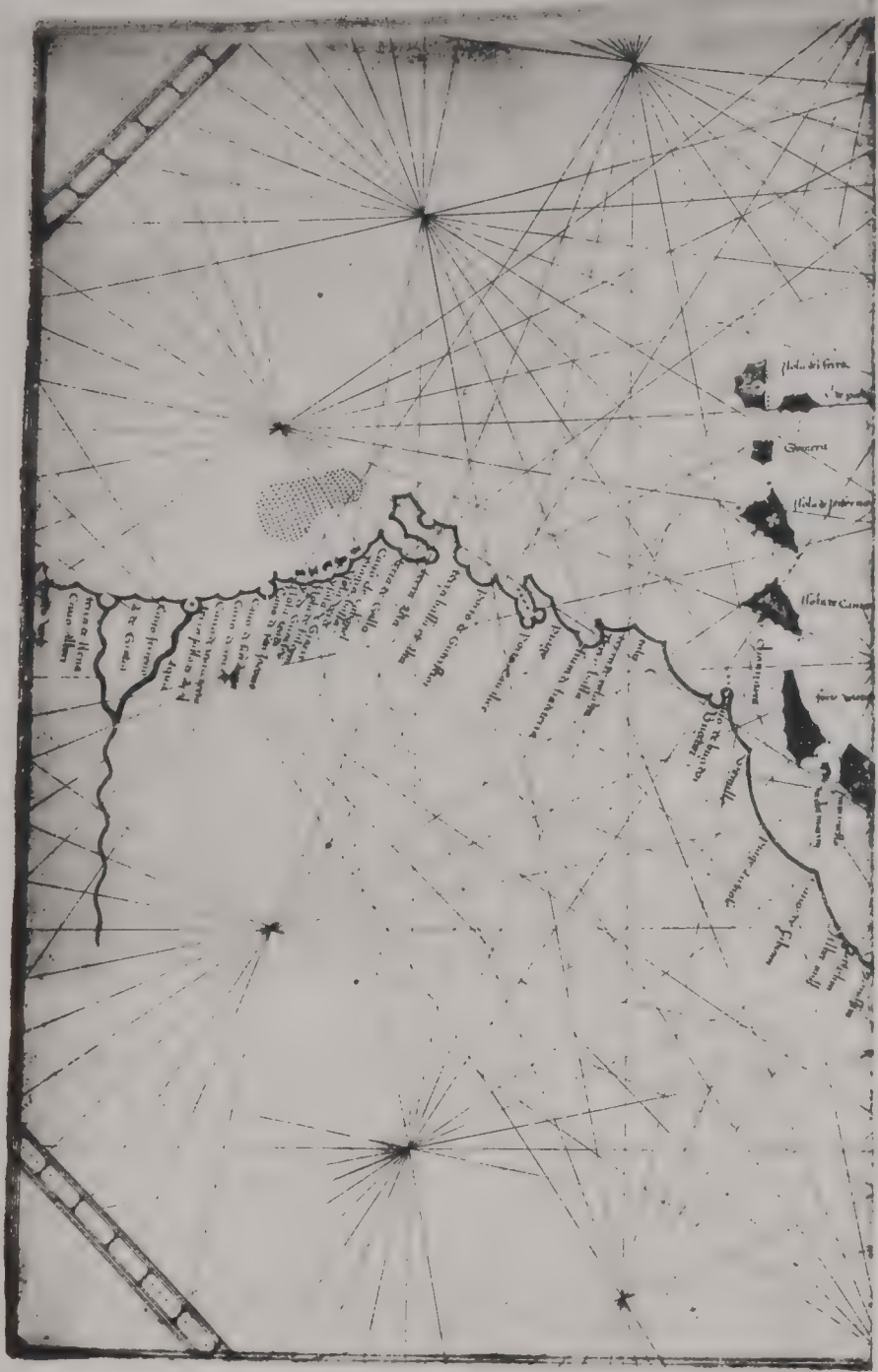


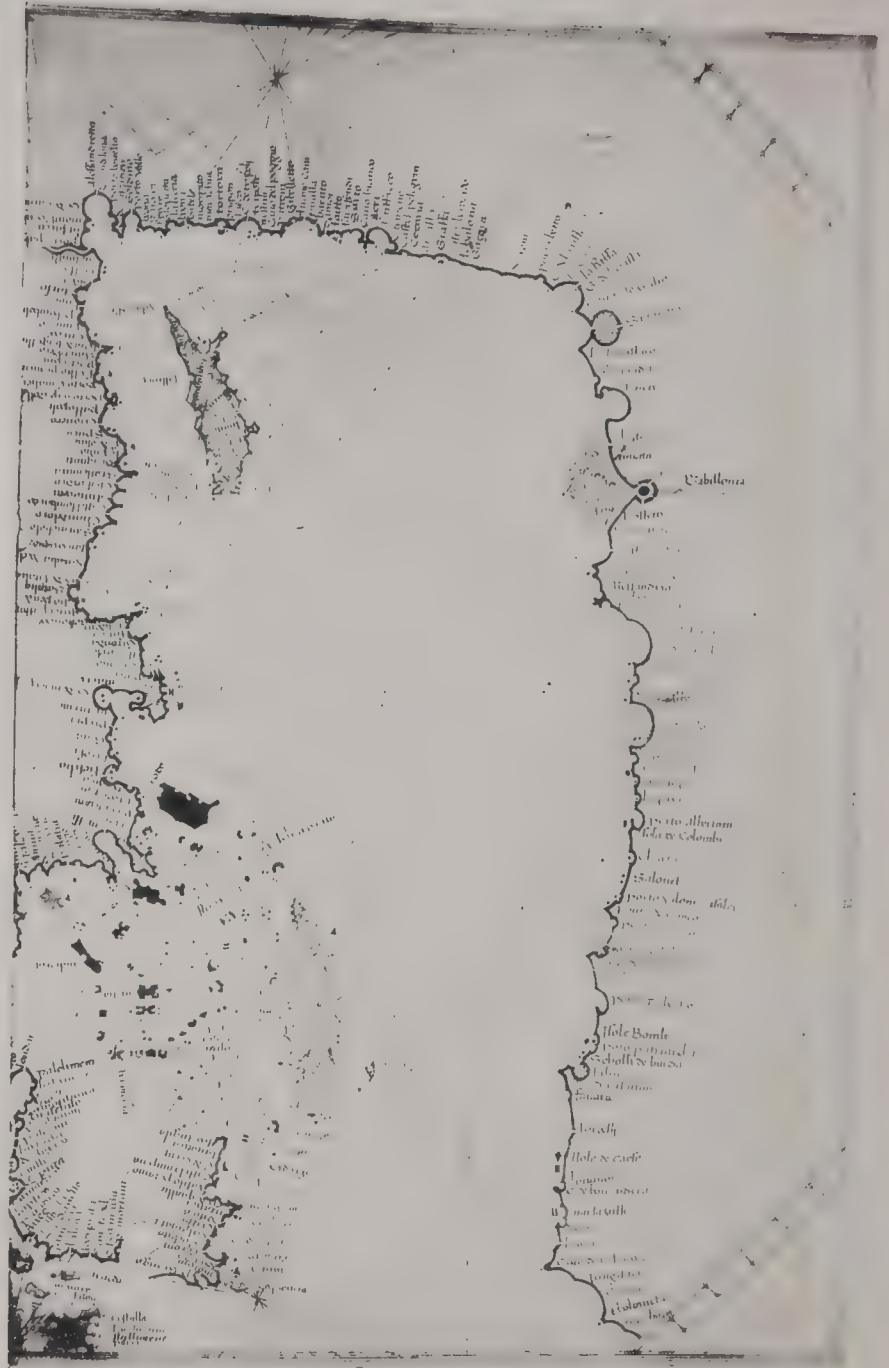


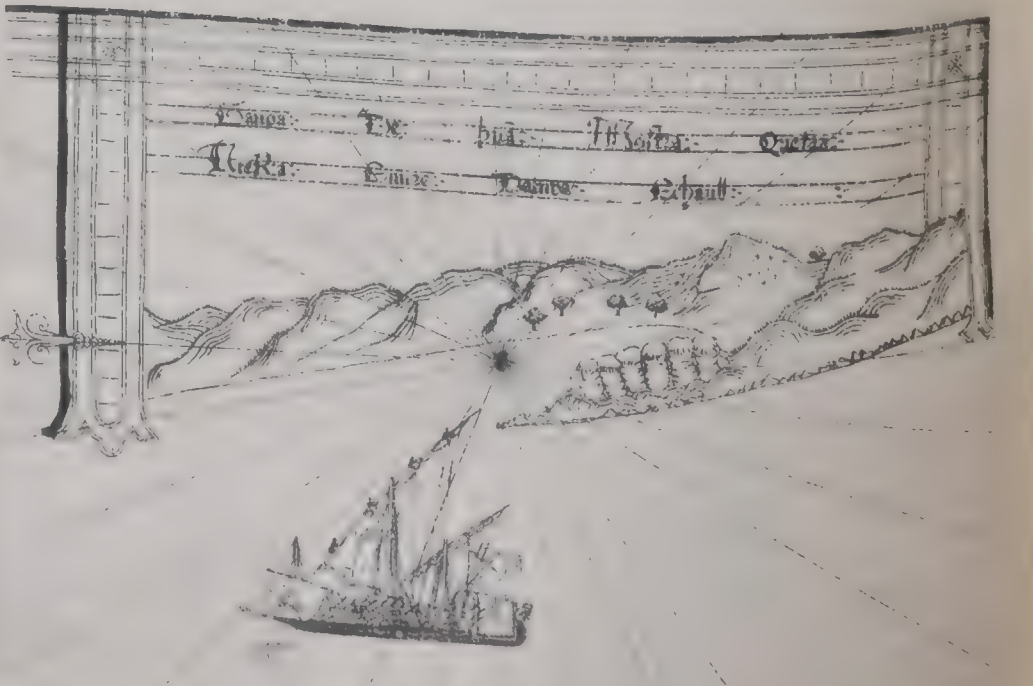
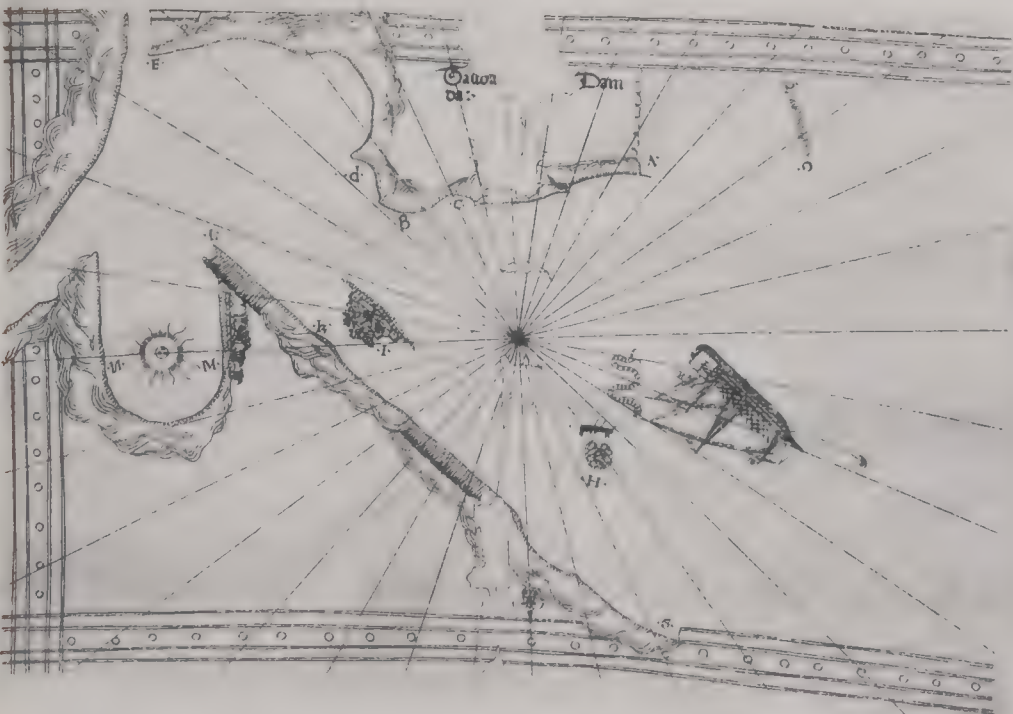
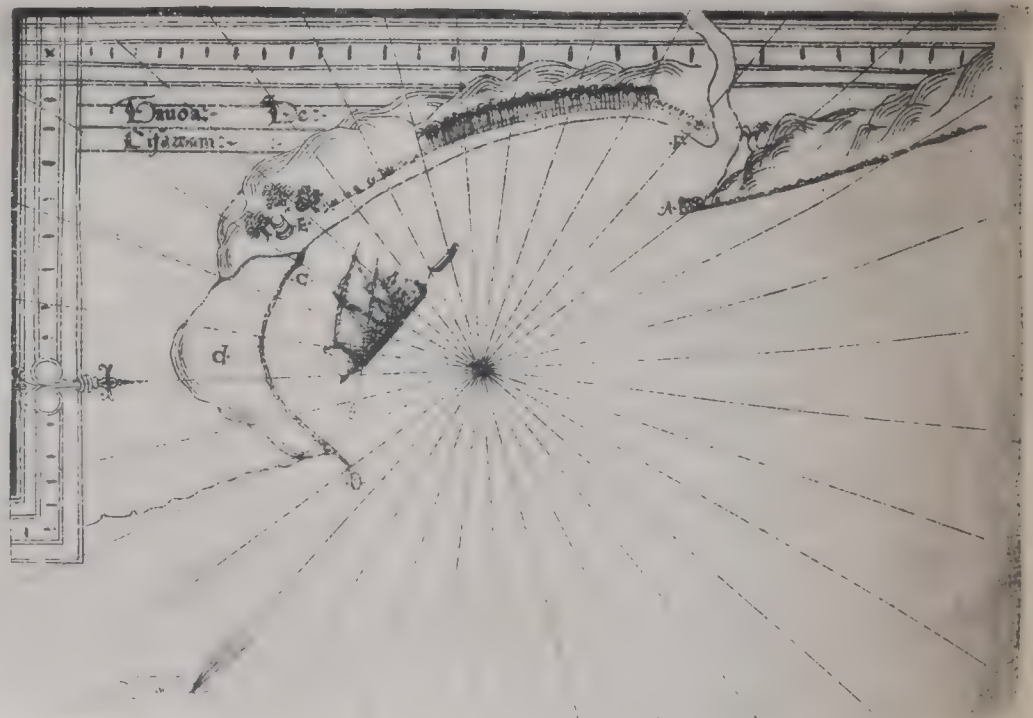
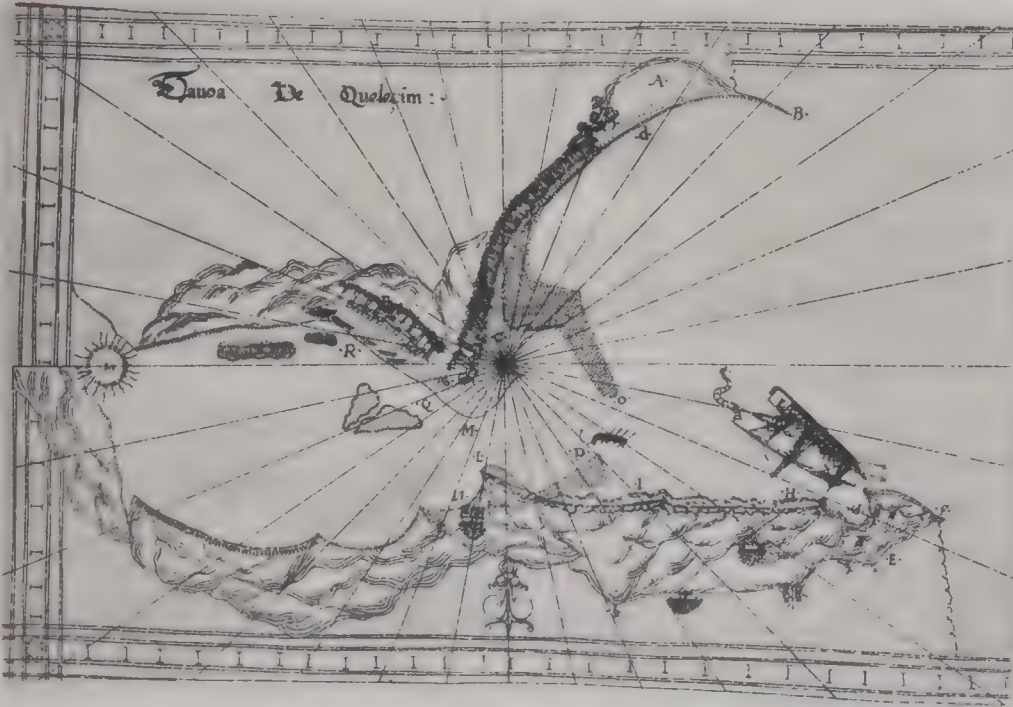
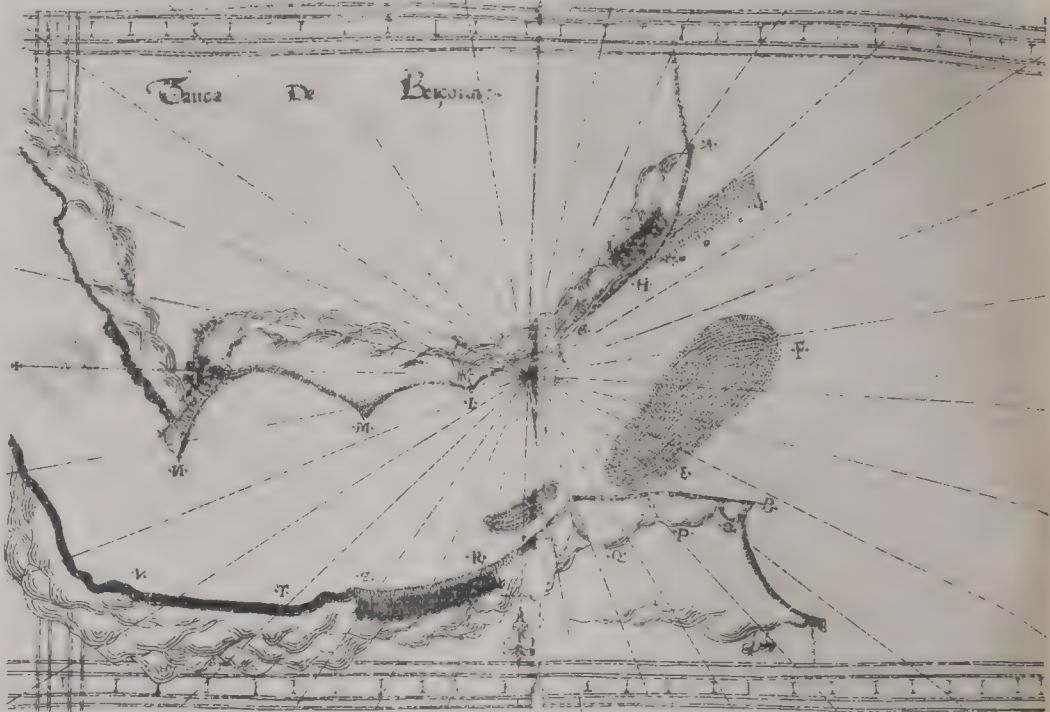
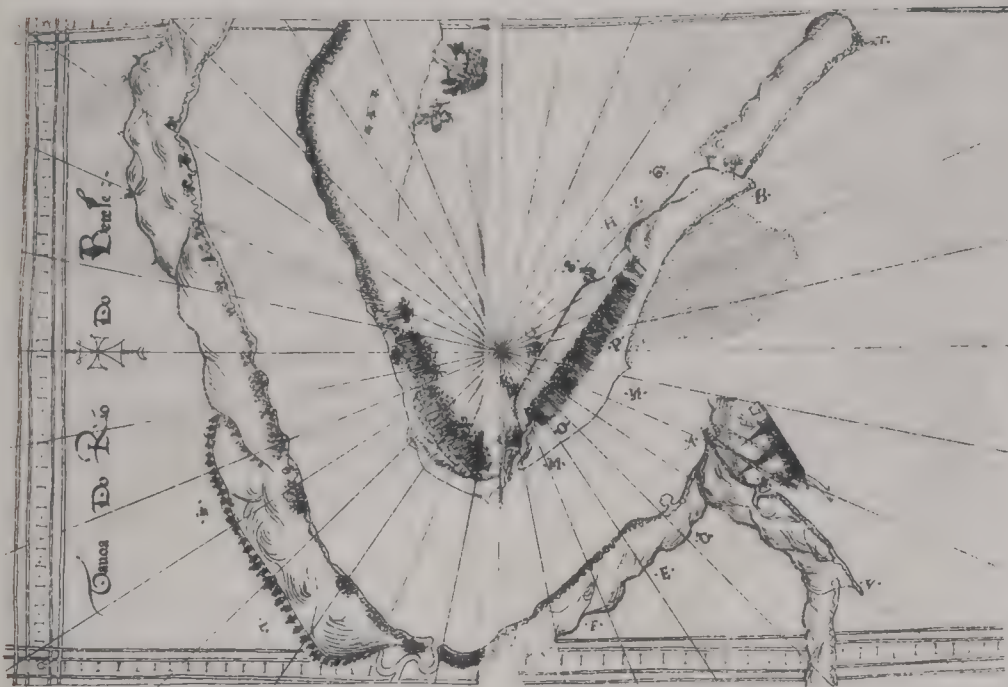
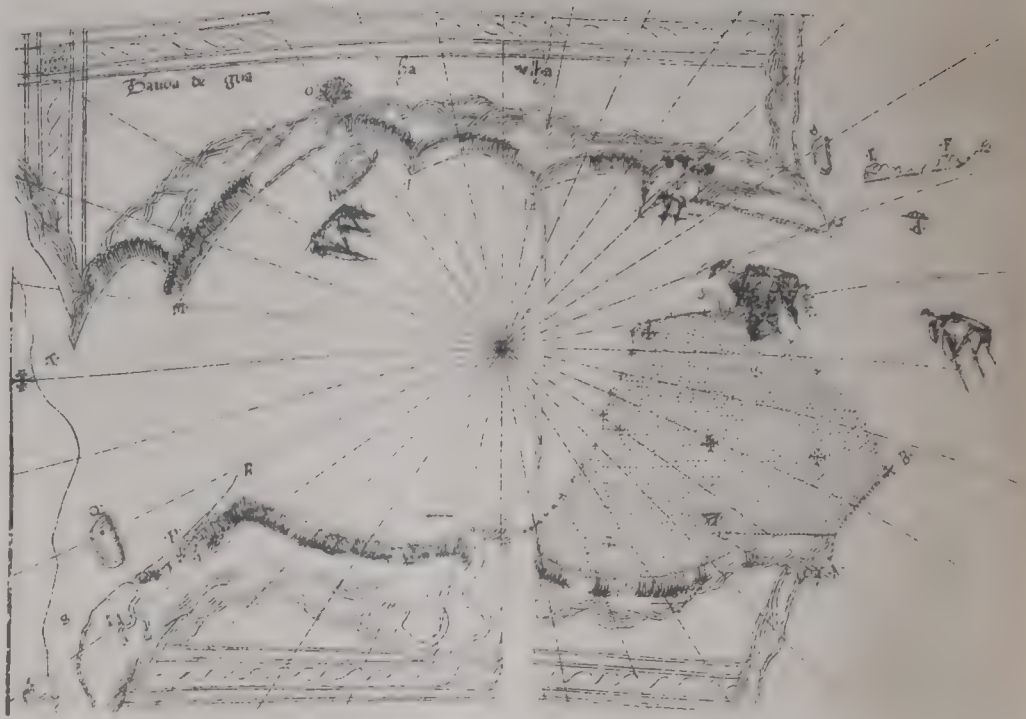


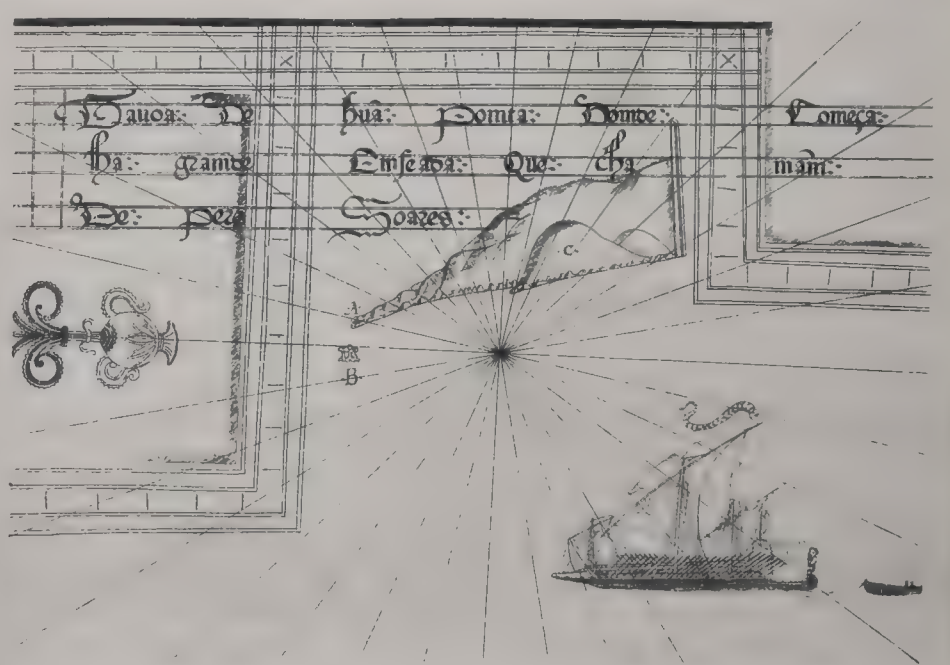
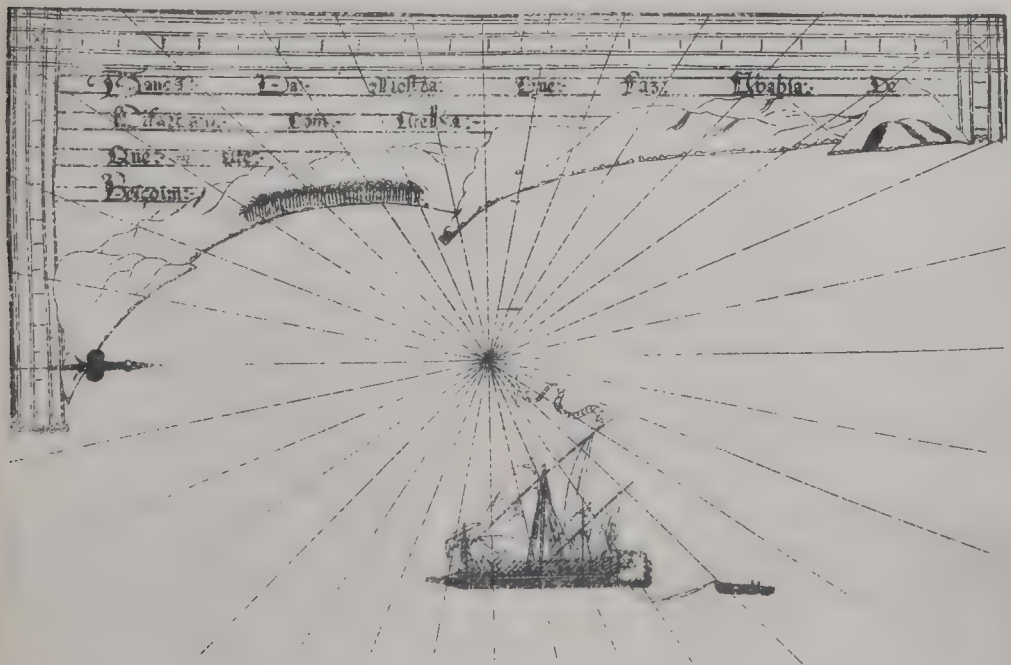
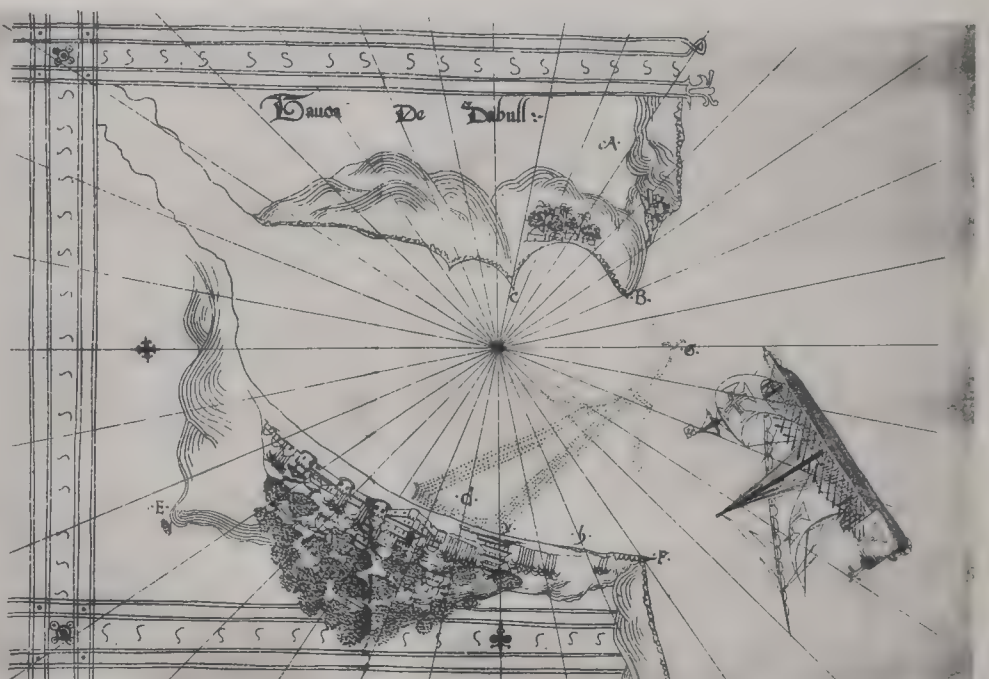
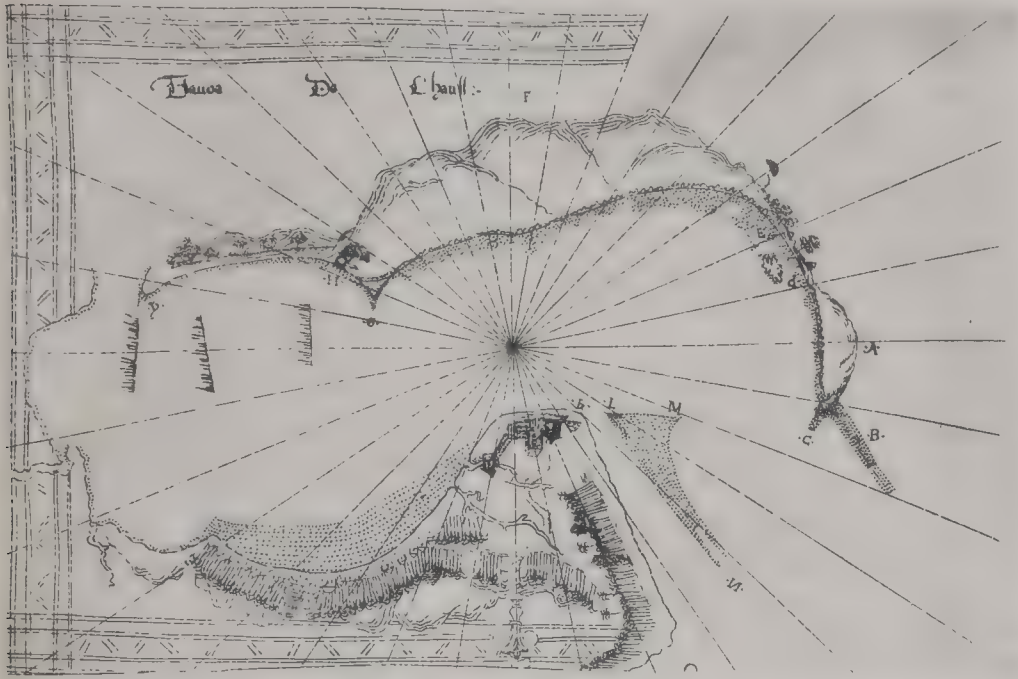
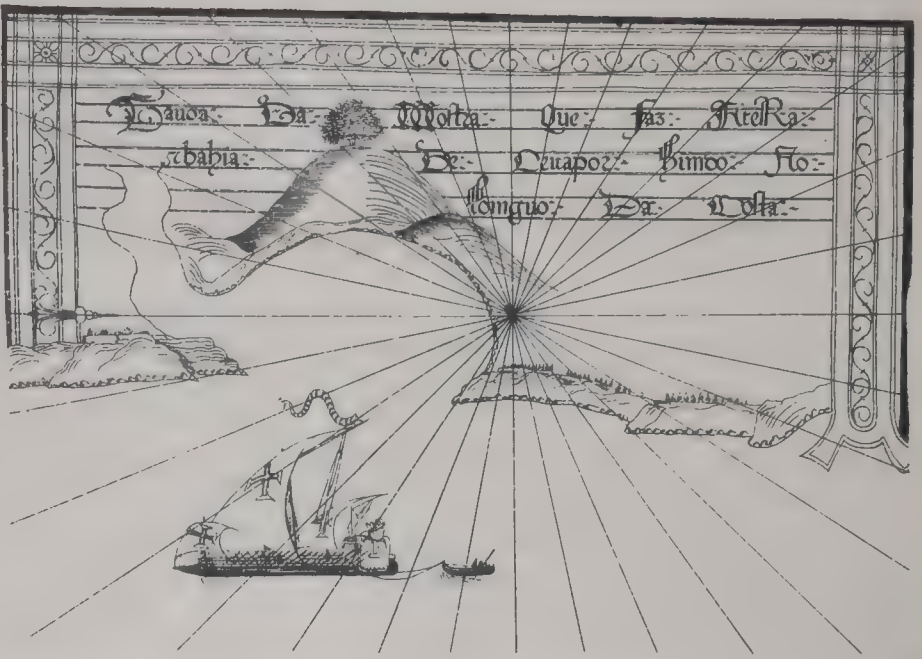
MAPPA MUNDI AUCTOR
OLIM IN BIBLIOTHECA CARDINALIS





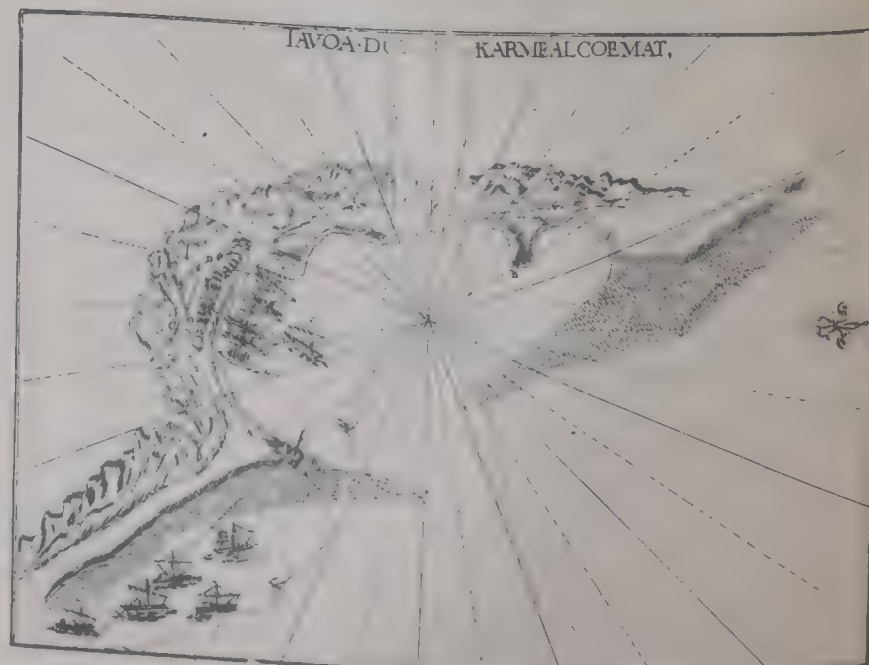
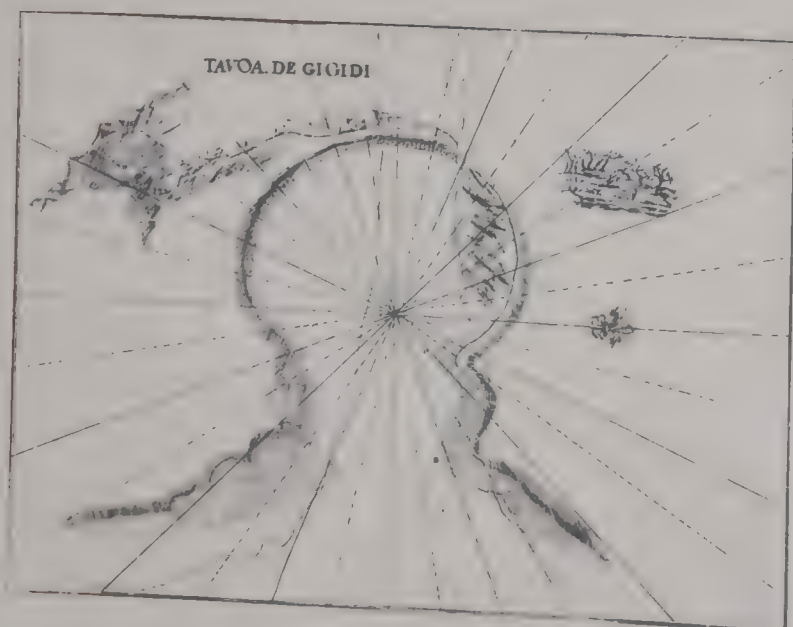
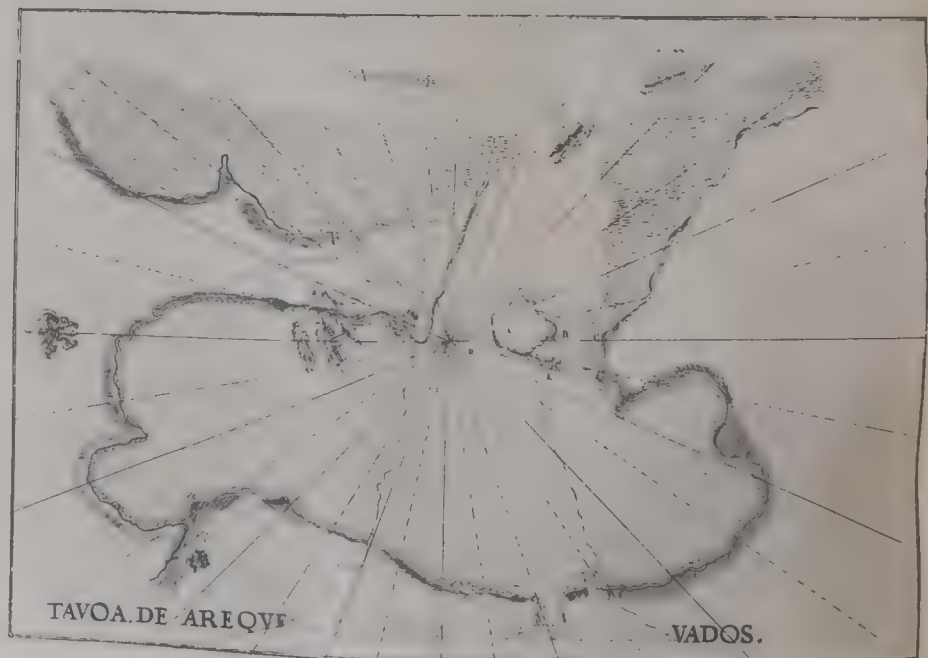
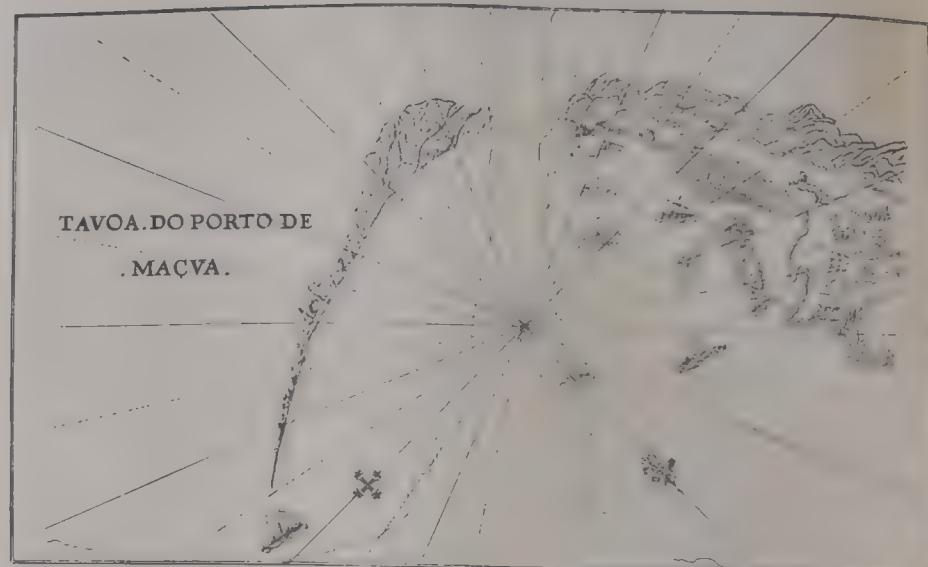
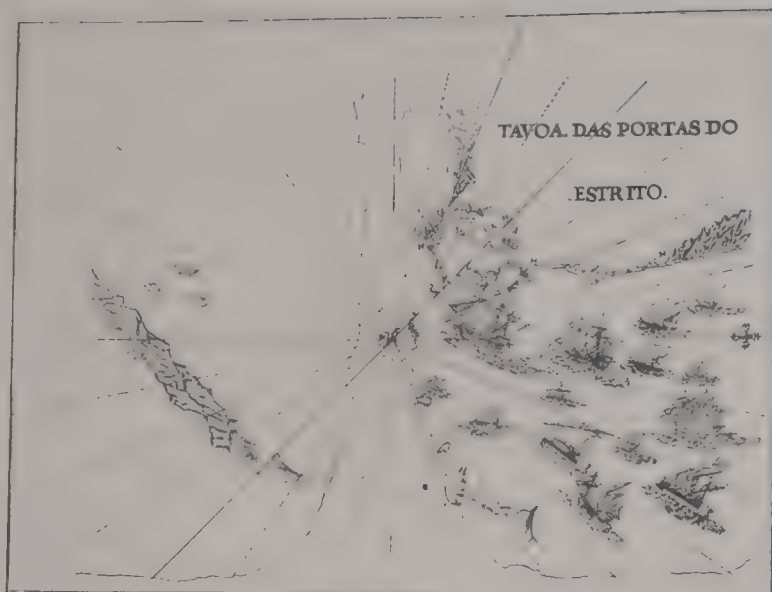
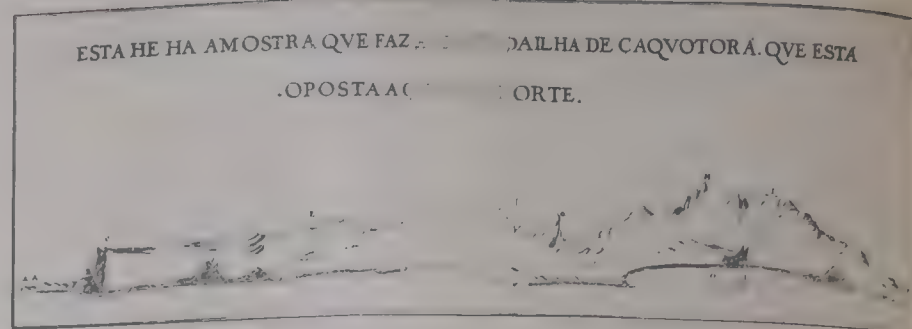
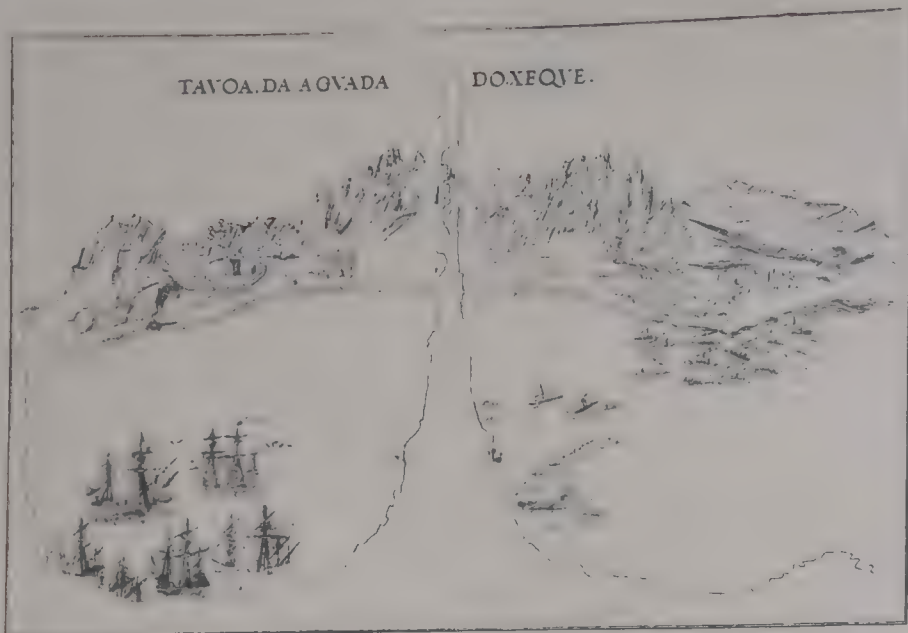


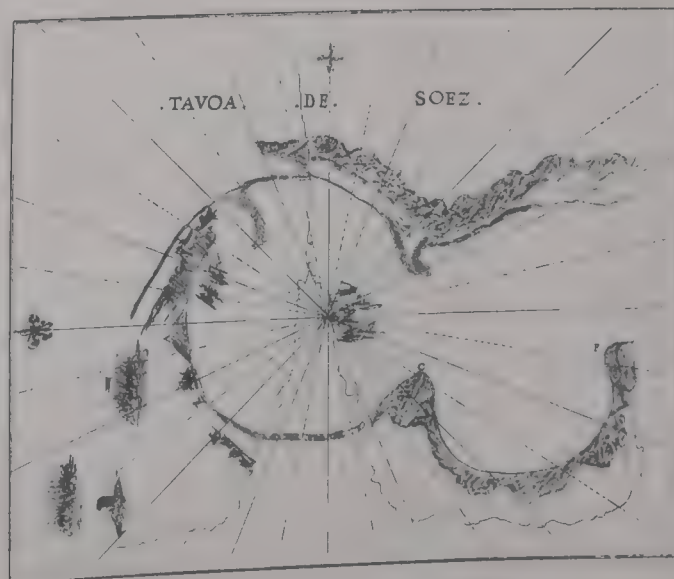
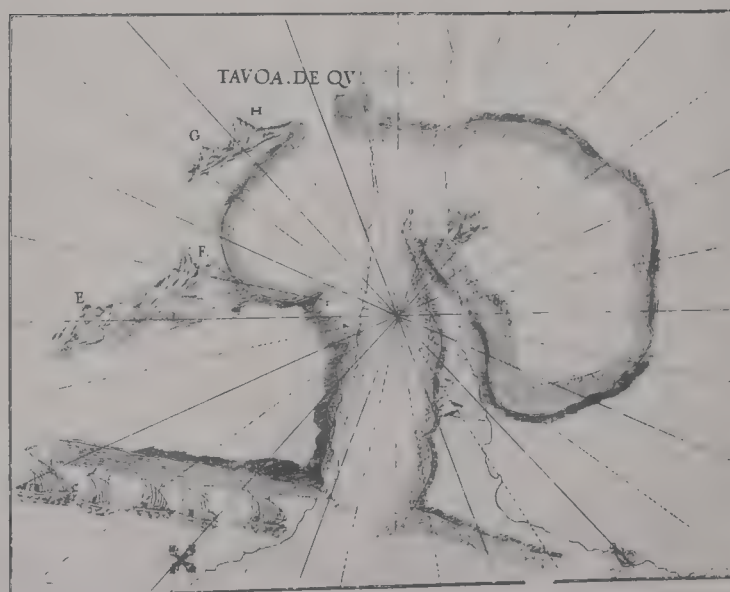
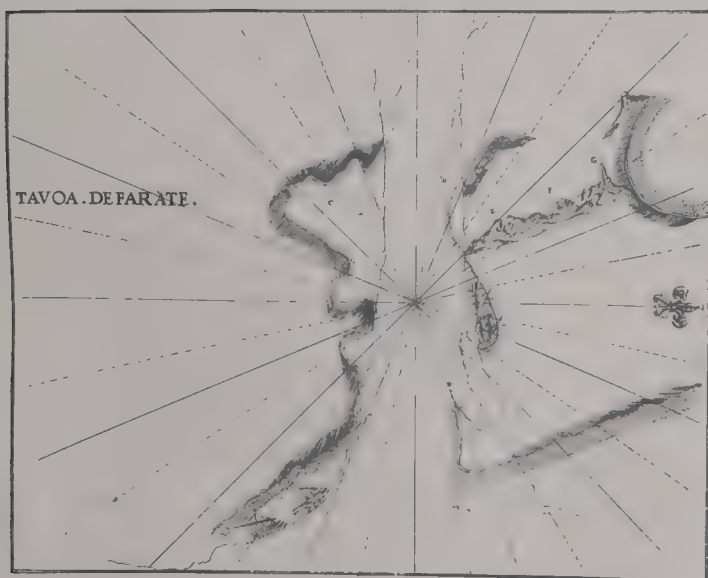
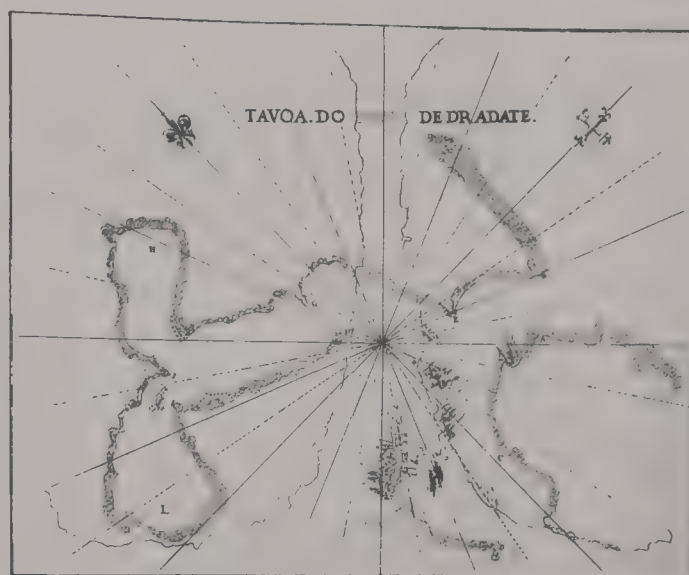
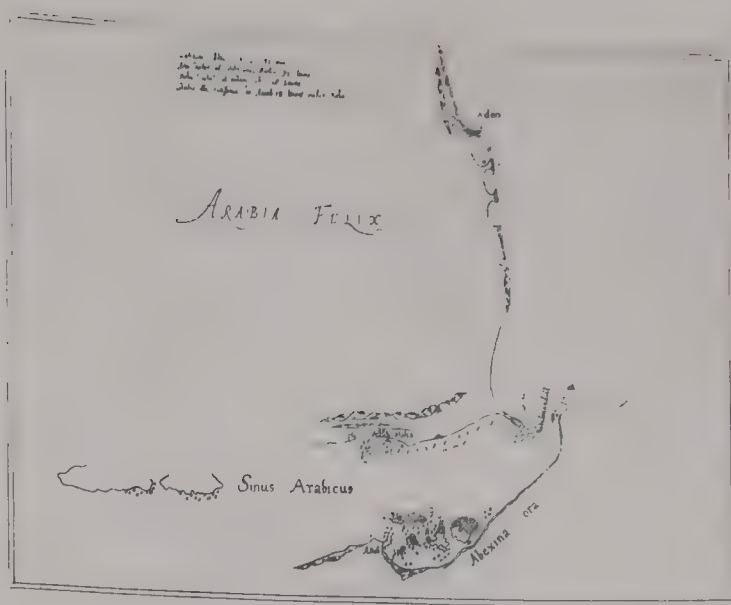
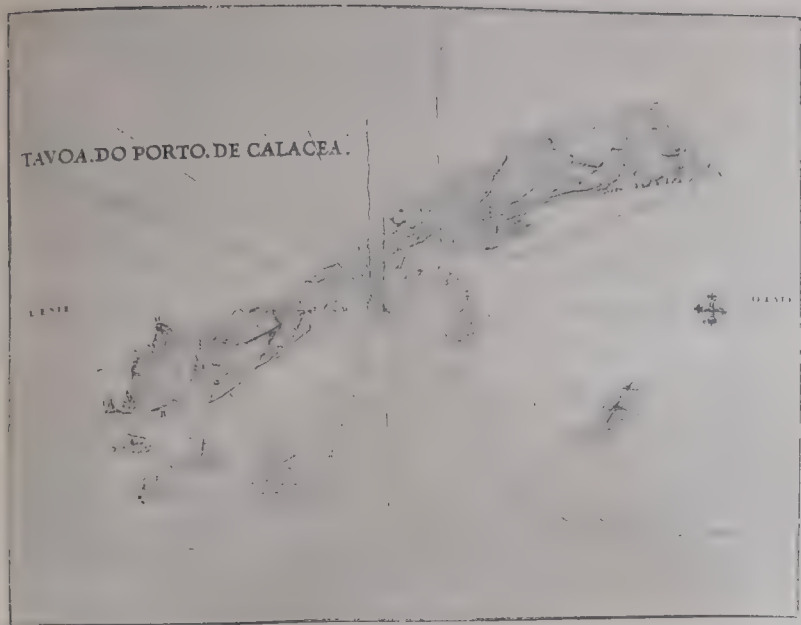




JOÃO DE CASTRO,
PRIMEIRA ROTEIRO DA COSTA DA INDIA
DESDE GOA ATÉ DIO.

1538 – 1539.











JUAN DE LA COSA 1500.

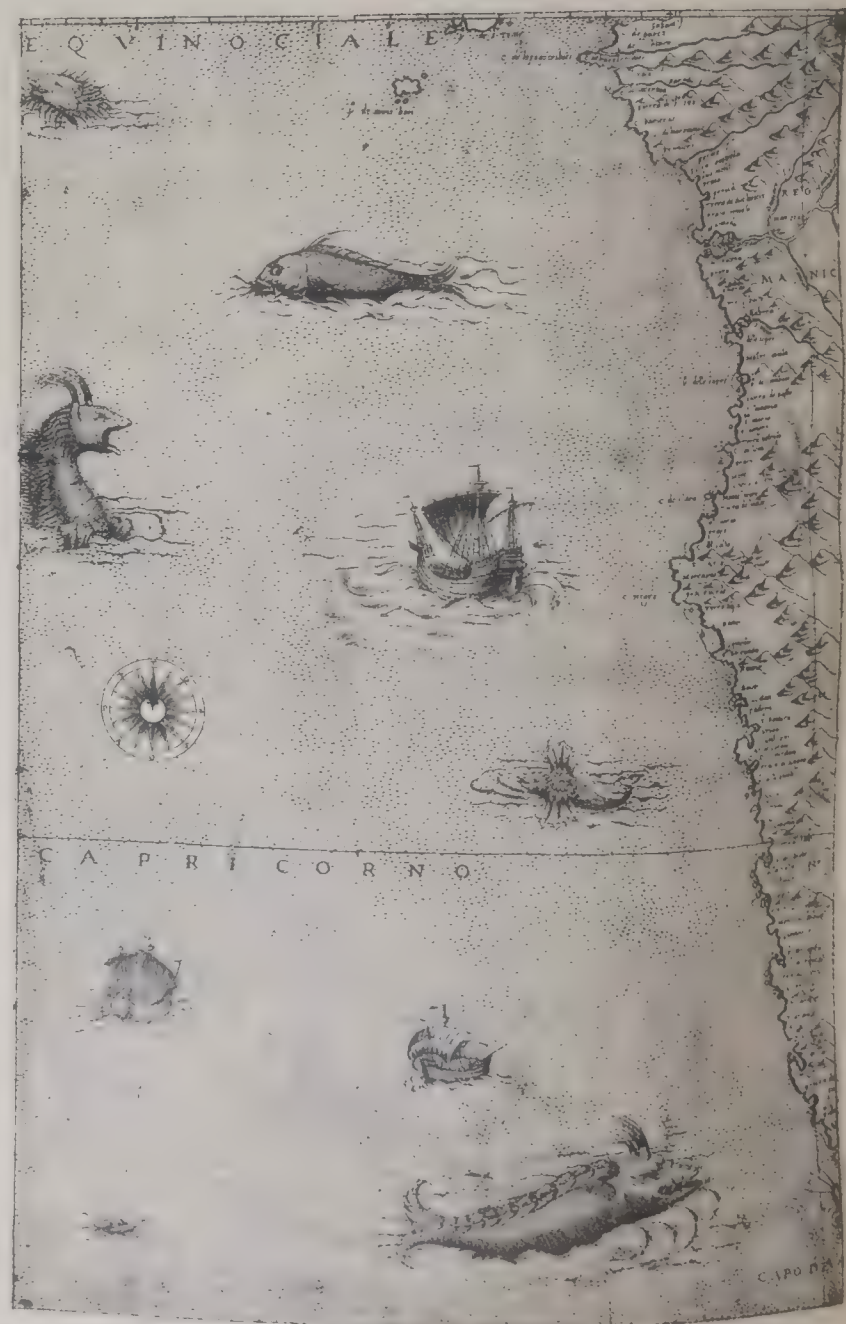
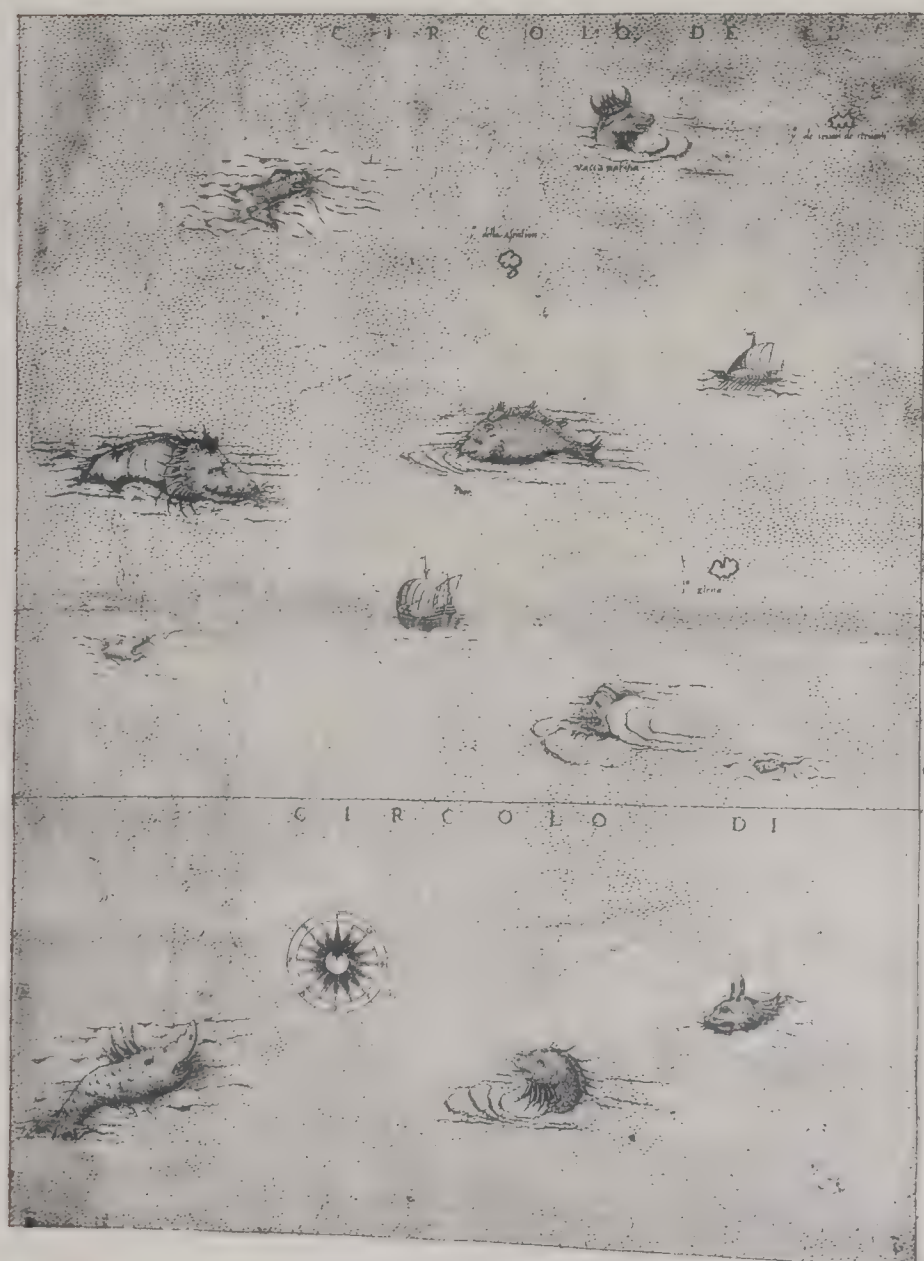
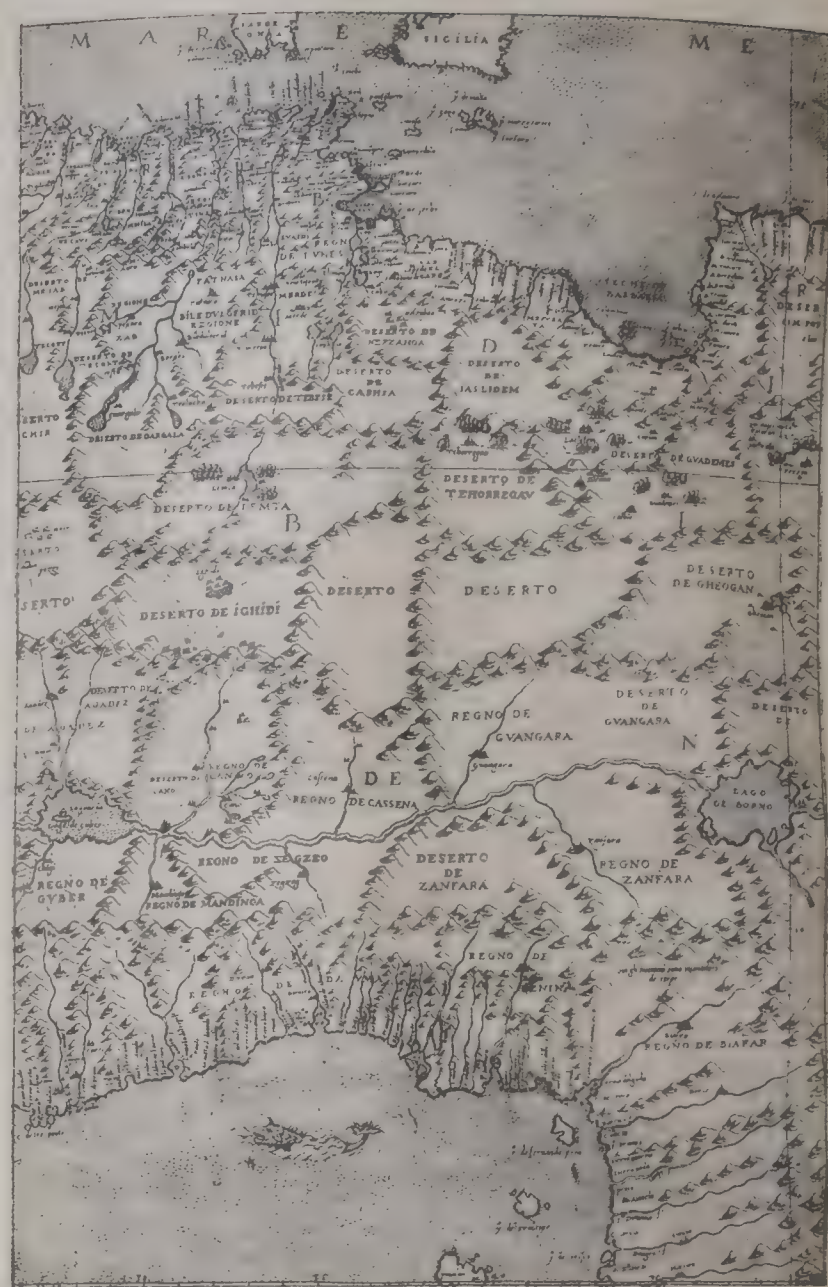


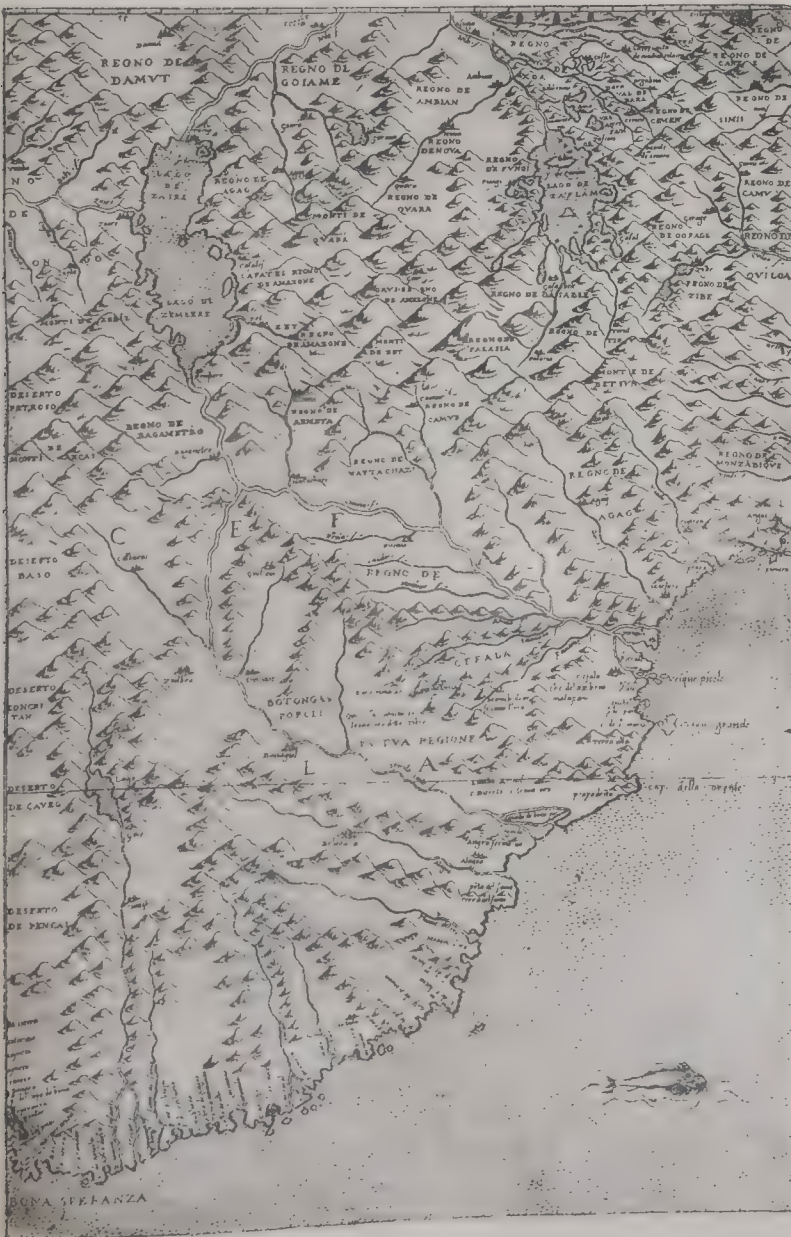
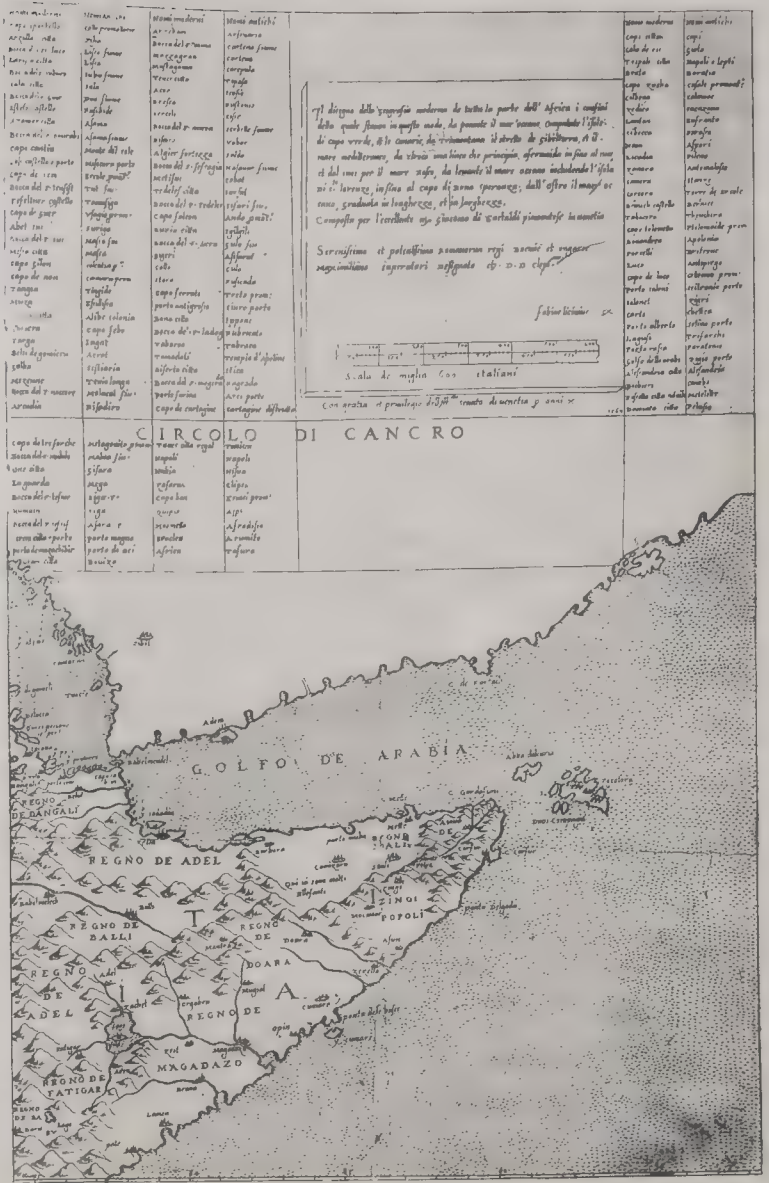
PETRUS APIANUS 1530.



CHARTA NAVIGATORIA AUCTORIS INCERTI (1502)









JOHANNES STABIUS 1515.

TOTIVS ORBIS DESCRIPTIO TAM VETERVM QVAM RECENTIVM GEOGRAPHORVM TRADITIONIBVS OBSERVATA NOVVM QVVS IOANIS VESPVCI FLORENTINI MACOLEI REGIS



JUAN VESPUCCI C. 1523

CIRCVLVS+ARCTICVS:



DIEGO RIE

del mundo descubierta fasta agora, hucola



Capitula don que hizieron los catholicos Reyes

descubierto fasta agora. hysola Diego Ribero cosmogra



ieron los catholicos Reyes de españa et de sevilla don

DIEGO RIBERO

Mapa de Su magestad: Año. de. 1529. è Semilla:-



Juan de portocual en Bordessillas: Año. de. 1494:-









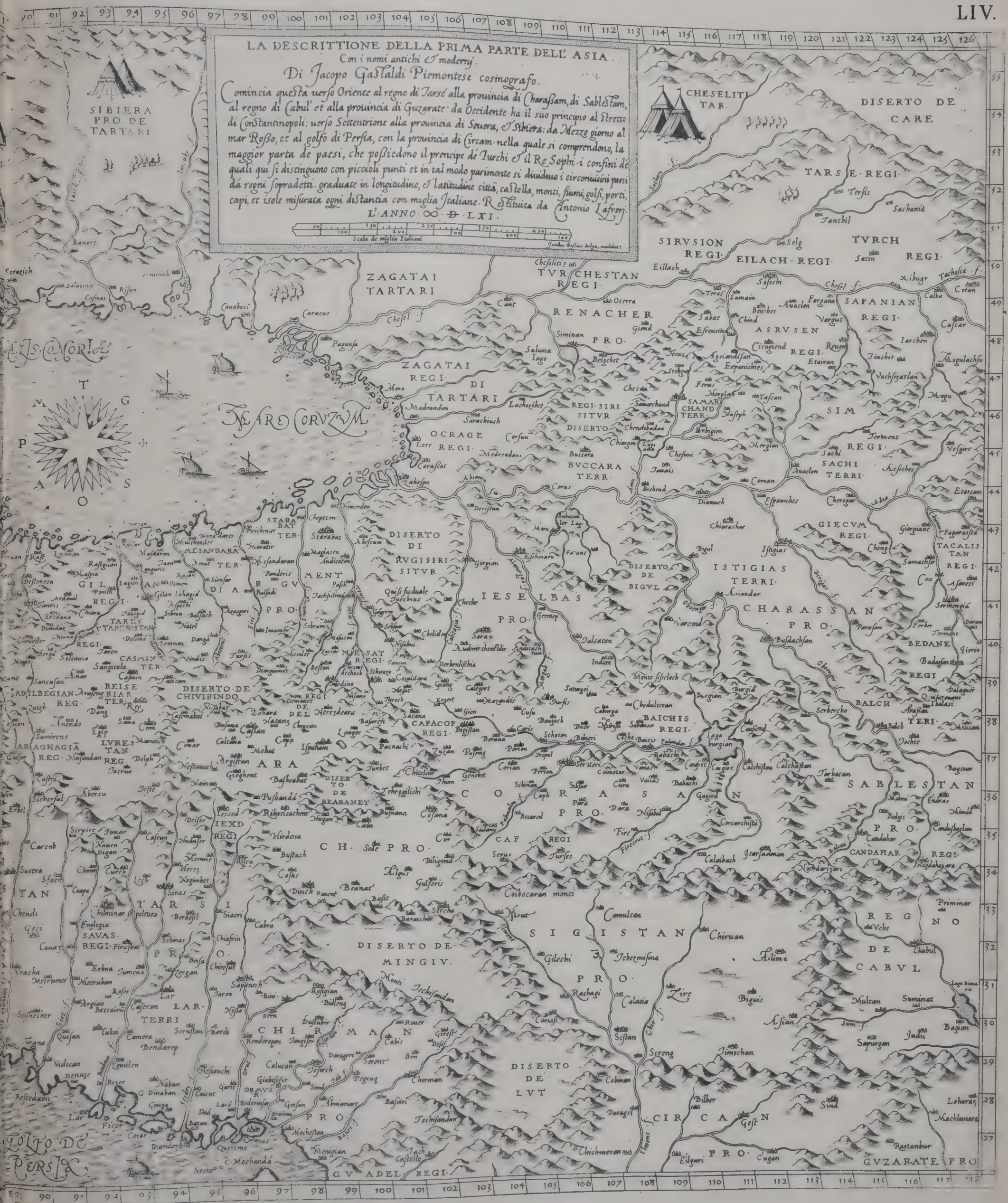
PIERRE DESCE





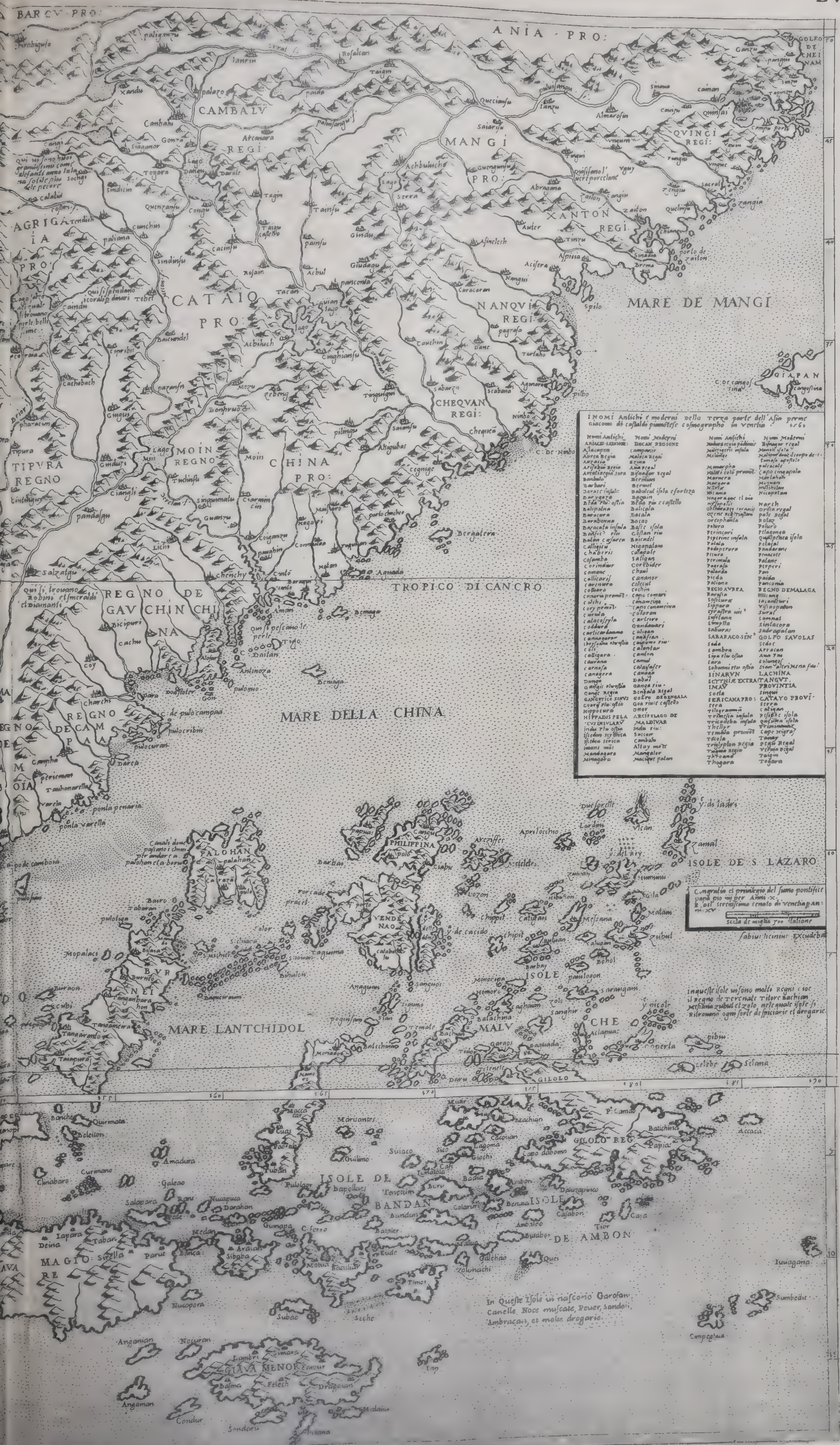


















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